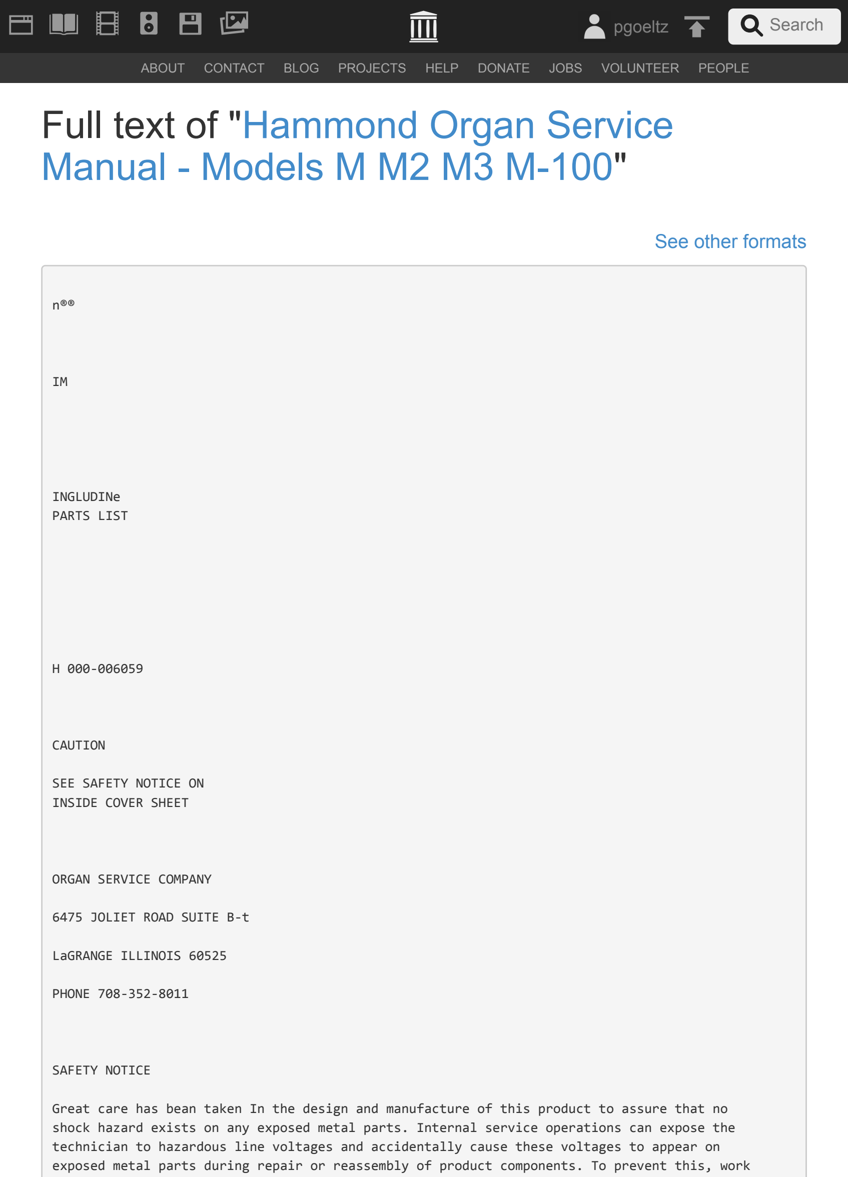

Full text of "Hammond Organ Service Manual - Models M M2 M3 M-100"

See other formats

n®®

IM

INGLUDINe
PARTS LIST

H 000-006059

CAUTION

SEE SAFETY NOTICE ON
INSIDE COVER SHEET

ORGAN SERVICE COMPANY

6475 JOLIET ROAD SUITE B-t

LaGRANGE ILLINOIS 60525

PHONE 708-352-8011

SAFETY NOTICE

Great care has bean taken In the design and manufacture of this product to assure that no shock hazard exists on any exposed metal parts. Internal service operations can expose the technician to hazardous line voltages and accidentally cause these voltages to appear on exposed metal parts during repair or reassembly of product components. To prevent this, work on these products should oniy be performed by those who are thoroughly familiar with the precautions necessary when working on this type of equipment.

To protect the user, It Is required that all enclosure parts and safety Interlocks be rettored to their original condition and the following tests be performed before returning the product to the owner aftor any service operation.

Plug the AC iine cord directiy Into a line voltage AC receptacle (do not use an Isolation transformer for this test) and turn the product on. Connect the network (as shown below) In senes with all exposed metal parts and a Known earth ground such as a water pipe or conduit. Use an AC VOM of 5,000 ohms per volt or higher sensitivity to measure the voltage drop across the network. Move the network connection to each exposed metal part (metal chassis, screw heads, knobs and control shafts, escutcheon, etc.) and measure the voltage drop across the network. Reverse the line plug and repeat the measurements. Any reading of 4 volts RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the product to the user.

n

TEST
PROBE

VOM
AC SCALE

I OK

I I

.01 Mf
CERAMIC RF
BYPASS CAP

TEST CLIPS

CONNECTEQ TO WQWN
EARTK ORQUHO

TO EXPOSED HETAL PARTS

TABLE OF CONTENTS

PAGE

PAGE

GENERAL DESCRIPTION

INSTALLATION AND MAINTENANCE

MUSICAL TERMS

NOTES AND OCTAVES

HABMONICS OR OVERTONES

ONE KEY DOES NOT PLAY 19
ONE NOTE IS WEAX 20
PERCUSSION NOTES VEAK 2I
PEDAL NOTE SOUNDS AT FULL VOLUME 21
PEDAL NOTE SOUNDS FAINTLY 21

BOW THE ORGAN WORKS

HUM

21

CONSTRUCTION AND OPERATION OF COMPONENTS 7
MOTORS AND POWER SWITCHES 7

TONE GENERATOR

MANUALS 8

HARMONIC DRAWBARS 9

PEDAL DRAWBAR 9

PEDAL KEYBOAIU) 9

EXPRESSION PEDAL 10

CONTROL TABLETS 10

PERCUSSION CONTROL TABS 10

VIBRATO TABS 11

+

PRESET TABS 12

REVERBERATION-VOLUME SOFT TABS ,,,.12

AMPLIFIER ASSEMBLY 12

MANUAL SECTION OF AMPLIFIER 13

PEDAL SECTION OF AMPLIFIER I A

INTERMEDIATE SECTION OF AMPLIFIER 15

OUTPUT SECTION OF AMPLIFIER ,.,. 15

PERCUSSION SECTION OF AMPLIFIER 16

POWER SUPPLY 17

TUBE SOCKET VOLTAGES H

REVERBERATION AMPLIFIER

17

SPECIAL EQUIPMENT 18

RADIO, PHONOGRAPH, OR MICROPHONE 18

EXTENSION SPEAKER 18

EAR PHONES IS

SPECIAL POV,^R SOURCES 19

PRACTICAL SERVICE SUGGESTIONS

19

ORGAN DOES NOT PLAY 19

REPLACING TUBES 22

PROCEDURE FOR REMOVING PARTS 22

UPPER MANUAL KEY 22

LOWER MANUAL KEY 22

DRAWBAR CONTACT SPRING 23

DRAWBAR OR DRAWBAR KNOB 23

UPPER MANUAL 24

LOWER MANUAL 25

CONTROL PANEL ACCESS 26

PERCUSSION SWITCH ACCESS 26

GENERATOR 26

STARTING MOTOR 26

PILOT LIGHT 26

TAB SWITCH 26A

VIBRATO LINE BOX 26A

PEDAL KEYBOARD 26A

EXPRESSION PEDAL 26A

PRESET PERCUSSION UNIT 77

SELECTOR SWITCH 78

HARMONIC BUSBAR SWITCHING & REIT- SPLIT 78

UPPER MANUAL 78

MODE SWITCH 79

FREQUENCY DIVIDER 79

CYMBAL AND BRUSH 80

BRUSH KEi'ING 80

. CYMBAL KEYING 80

CXMBAL-BRUSH AMPLIFIER AND NOISE GATE 80

CH.\NnES AM REVISIONS 81

IiKTALLr\TION AND MAINTENANCE BACK COVER

LIST OF FIGURES AND ILLUSTRATIONS

FIGURE

PAGE

1 . Front View of Console - Model M 27

2. Front View of Console - Model M-2 28

3. Back View of Console - Model M, M-2 29

4. Front View of Console - Model M-3 30

5. Back View of Console - Model M-3 31

6. Front View of Console - Model M-lOO 32

7. Back View of Console - Model M-lOO 33

8. Block Diagram - Model M ." 34

9 . Block Diagram - Model M-2 34

10. , Block Diagram - Mcdel M-3 35

11. Block Diagram - Model M-lOO 35

12. Typical Tone Generator

36

13. Magnet Locations on Tone Generator . , , . 36

14 . Generator Cover - Model M 37

14A. Generator Cover - Model M - Serial 15083 and Up 37

15. Generator Cover - Model M, M-2, M-3 38

16 . Generator Cover - Model M-3 - 90485 and above 39

17. Generator Cover - Model M-lOO

40

18. Manual Wiring Chart 41

19. Drawbar Assembly 42

20. Pedal Keyboard Assembly - M, M-2, M-3 42

21. Pedal Keyboard Assembly - M-lOO 43

22. Fundamental Vibrato System - M 43

23. Vibrato System - Model M - 13509 and below 44

24. Vibrato System - Model M - 13509 and above 44

25. Fundamental Vibrato System - M-2, M-3 45

LIST OF FIGURES AND ILLUSTRATIONS CONTINUED

FIGURE

PAGE

26. Fundamental Vibrato System - M-lOO 46

27. Vibrato Line Box-Model M, M-2 46

28. Vibrato Line Box - M-3 47

29. Vibrato Line Box - M-lOO

47

30. Vibrato Scanner 47

31. Vibrato System M-2 - Serial 19000 to 22253 48

32. Vibrato System M-2 - Serial 25254 and above 48

33. Manual Hold Down Screws (M, M-2, M-3) 49

34. Pictorial - Model M Amplifier 50

35. Pictorial - Model M Amp. - Serial 8411 and above 51

36. Pictorial - Model M-2 Amp. Serial 19000 and above 52

36A. Pictorial - Model M-3 Amp (Partial) 53

36B. Pictorial - Model M-3 Amp

54

37. Schematic AO-35 Reverberation Amp M-lOO 55

38. Schematic AO-44 Reverberation Amp M-lOO 56

38A. Schematic AO-44 - See Serial Numbers 57

39. Schematic AO-66 Reverberation Amp (Later Model M-lOO) 58

40. Schematic Model M 59

41. Wiring Diagram Model M

60

41A. Wiring Diagram Model M - Serial 15083 and above 61

42. Schematic Model M-2 - 19000 and above 62

43. Wiring Diagram Model M-2 - Serial 19000 and above 63

43A. Wiring Diagram Model M-2 - Serial 25254 and above 64

44. Schematic Model M-3 65

F

44A. Schematic Model M-3 Serial 90485 and above 66

44B. Schematic Model M-3 - Serial 109466 and above 67

45. Wiring Diagram Model M-3

68

LIST OF FIGURES AND ILLUSTRATIONS CONTINUED

FIGURE

PAGE

45A. Wiring Diagrams Model M-3 - Serial 90485 and above 69
46. Schematic Model M-lOO with AO-35 and AO-29 70
47- Schematic Model M-lOO with AO-44 and AO-29 71
48. Schematic Model M-lOO with AO-66 and AO-67 72
49. Wiring Diagram M-lOO with AO-35 Amp 73
50 . Wiring Diagram M-lOO with AO-44 Amp 74
51. Wiring Diagram M-lOO Control Panel , 73

i

M-IOOA SUPPLEMENT

52. M-IOOA Percussion Kit Wiring Diagram 82
53. Brush and Cymbal Wiring Diagram with AO-66 Amp 83
54. Brush and Cymbal Wiring Diagram with AO-44 Amp °^
55. Schematic - Percussion Preset Unit 85
56. Schematic Diagram Model M-IOOA 87
57 . Wiring Diagram Model M-IOOA 88
58. Percussion Kit Circuit Board Component Layout 89

GENERAL DESCRIPTION

The Hammond Organ "m" Series Spinet Consoles are completely self contained, requiring no external tone cabinet. All Models have two (2) manuals of forty-four (44) keys each, a 12 (M, M-2, M-3) or 13 (M-lOO) note pedal keyboard, and an expression (or swell) pedal for controlling the volume. All tones are produced by electro-magnetic tone generators and electrically amplified. Selection of tone colors is made by adjusting eighteen(18) drawbars, and other characteristics of the music are adjusted by means of tilting control tablets and tab switches. A push button and a toggle switch or two toggle switches located in the front of the Console are used to turn on the organ.

Figures 1 thru 7 show the front and rear views of the "M" Series Models- The rear views are shown with the dust covers removed. Console rear panels are an optional accessory and are not shown.

INSTALLATION AND MAINTENANCE

A card packed with the playing instructions or located in the bench gives full information on installing the organ, oiling, and packing for moving or shipment. (See Back Cover)

MUSICAL TERMS

The service man who has had no musical training will find the following information helpful in studying the operation of the organ.

NOTES AND OCTAVES

Keyboard instruments are divided into '^octaves" of 12 keys or notes, each with spven (7) ''naturals" (white keys) and five (5) "sharps" or "flats" (black keys) in a definite sequence. Black keys occur in groups of two and three in each octave and offer a convenient way to identify the notes of the octave. Technically there is no difference between a black key and a white one, since each key has a frequency 1.059 times the frequency of the next one below it.

Each note has a frequency exactly one half that of the corresponding note in the next higher octave. Each white key is called by a letter for A to G and these letters are known as "note of the musical scale", A black key may be called a "sharp"of the notes below it or a '^flat" of the notes above it; for instance, the black key between C and D may properly be called Cif (Sharp) or D*^ (D flat).

HARMONICS OR OVERTONES

Any musical note has a definite fundamental pitch or frequency and also a certain "tone quality" or "timbre" depending on its wave shape. A complex note is one which includes not only a fundamental frequency but also one or more "harmonics" or "overtones," each of which is an integral multiple of the fundamental frequency. Such a combination is more pleasing musically than a note having only a single frequency. The ear does not distinguish the harmonics independently , but instead identifies the note as a complex tone having the pitch of the lowest component, . or fundamental .

HOW THE ORGAN WORKS

Most tone sources, such as strings, reeds , or pipes, produce complex tones . The Hammond tone producing mechanism, however, generates individual frequencies which can be combined by means of harmonic drawbars to produce any desired tone quality. The block diagrams in Figures 8 thru 11 show the chief components of the instruments.

Electrical impulses of various frequencies are produced in the "tone generator'^ which contains a number of "tone wheels" driven at predetermined speeds by a motor and gear arrangement. Each tone wheel is a steel disc similar to a gear^ with high and low spots, or teeth, on its edge (see figure 12). As the wheel rotates these teeth pass near a permanent magnet, and the resulring variations in the magnetic field induce a voltage in a coil wound on the magnet. This small voltage, when suitably filtered, produces one note of the musical scale, its pitch or frequency depending on the number of teeth passing the magnet each second.

A note played on either manual of the organ consists of a fundamental pitch and a number of harmonics, or multiples of the fundamental frequency. The fundamental and eight harmonics available on each playing key are controllable by means of drawbars. By suitable adjustment of these controls the player may vary the tone colors at will. The M-lOO Console has several preset tabs which make several pre-selected tones available,

MODEL M

Mixed tones from the manuals are amplified and then pass through the vibrato mechanism, the expression control, and additional stages of amplification before reaching the loudspeaker -

MODEL M-2i M-3i M-lOO

Mixed tones from either the upper or the lower manual may go through either the "vibrato" channel or the "No Vibrato" channel, depending on the position of the corresponding vibrato selector of "Vibrato Cancel" tabs. (The upper manual is called "Solo" on the selector tab of the M-2 and M-3 to indicate that it is best suited for playing melody or solo parts of the music.) The tones are then combined and passed through the expression control and additional stages of amplification before reaching the speaker(s)-

MODEL M-3» M-lOO

Percussion tones are produced by borrowing a signal from the upper manual 2nd harmonic drawbar, 3rd harmonic drawbar, or both, amplifying it, returning part of the signal to the same drawbar, and conducting the balance of the signal through push-pull control tubes where its decay characteristics are controlled. The percussion signal is then combined with the signal from the manuals after the vibrato system but before the expression control. The control tubes are keyed through the 6th harmonic key contacts and bus bar.

The pedal tones do not require drawbars for tone color variation, because they are produced as complex tones by special tone wheels. From the pedals these tones go to a pedal amplifier, where the attack and decay characteristics are controlled. The single pedal drawbar adjusts the volume of the pedals relative to that of the manuals, and the pedal signal than is combined with the signal from the manual before passing through the expression control, but after the vibrato system.

CONSTRUCTION AND OPERATION OF COMPONENTS

In reviewing this section refer to the schematic circuits of the entire organ systems in the back of this manual. Connections between components are shown in the wiring diagrams and control assembly wiring drawings, also in the back of the manual,

MOTORS AND POWER SWITCHES

The tone generator assembly in which all tones of the organ originate, is driven at constant speed by a synchronous motor, located at the left side as you look in at the back of the Console. Attached to it is the vibrato scanner. As the synchronous motor is not self-starting, it must be brought up to speed by a starting motor at the opposite end of the generator.

The procedure for turning on the organ is as follows: Push the "start'' switch up (M-3, M-lOO) or in (M, M-2) and hold it for approximately eight seconds. This allows time for the starting motor to bring the generator up to slightly above it synchronous speed- While still holding the "start" switch, push the "run" switch upward to its "on" position. This turns on the synchronous motor and at the same time introduc,es a resistor in series with the starting motor to reduce its power- Hold the "start" switch about four seconds longer and then release it-

During this time the braking action of the synchronous motor, together with the reduction in power of the starting motor, brings the system to synchronous speed so that the synchronous motor can carry the load.

To turn off the. organ, push the "run" switch downward to the "off" position.

a

TONE GENERATOR

All tones of the organ originate as electrical signals in the tone generator assembly. The M, M-2 and M-3 contains 85 tone wheels while the M-lOO has 87, Each of these wheels has various numbers of teeth, with suitable gears for driving them at various speeds from a main shaft extending along the center. Each pair of tone wheels is mounted on a shaft and between them is a bakelite gear held between two coil springs, forming a mechanical vibration filter. As the gear is not rigidly attached to the shaft, any pair of wheels which may be stopped accidentally will not interfere with the operation of the others.

Adjacent to each tone wheel is a magnetized rod with a pick-up coil wound on it. These magnets extend through the front and back of the generator, and are held by set screws which can be loosened in case adjustment is ever necessary. Figure 13 shows where to find the magnet for any frequency number. In this

drawing the dotted lines indicate frequencies whose tone wheels are on the same shaft.

On top of the tone generator assembly are small transformers and condensers , forming tuned filters for the higher frequencies. They are not likely to need replacing. In case one filter becomes inoperative, both the transformers and condenser must be replaced with a matched set from the factory. Figures 14, 15 » 16 and 17 show the locations of these filters on the indicated models. A few frequencies use untuned filters consisting of coils alone.

The output frequencies of the tone generator are numbered , for convenience, in order of increasing frequency. The lowest, number 1 , is about 32 cycles per second, and the highest, number 91, is about 6000 cycles per second. Frequency numbers 1 to 12 (1 to 13 on M-lOO) are used for pedals; numbers 13 to 17 (14 to 17 on M-lOO) are omitted; and numbers 18 to 91 are used for the manuals.

In case any generator frequency is weak or absent, refer to "Practical Service Suggestions" for the procedure to be used in locating and correcting the trouble.

The output terminals of the generator consist of solder lugs mounted on the filter transformers, to which the manual cable and pedals are connected* The frequency numbers of all terminals are indicated in Figures 14, 15, 16 and 17.

MANUALS

Musical frequencies from the tone generator go through the manual cable to terminal strips on the two manuals and from them to the key contact springs- Each of the two manuals has forty-four (44) playing keys, or approximately 3-1/2 octaves. The two manuals do not cover exactly the same pitch range, but they are arranged so that keys of like pitch are in line. Middle "C" is the first C on the upper manual and the key in line with it on the lower manual.

Under each key are a number of contact springs (for the fundamental and harmonics of that key) which touch an equal number of busbars when the key is pressed, (Some keys at the right end of each manual have fewer springs, as noted below) - All contact springs and busbars have precious metal contact surfaces to avoid corrosion, and the manuals are sealed to exclude dust so far as possible. In case a contact becomes dirty in spite of these precautions, a busbar shifter (shown in Figures 3, 5,7) is provided in each manual to slide the busbars endwise and thus provide a fresh contact surface.

The busbar shifting mechanism is somewhat different on the M-lOO than on prior models of the Hammond Orgam Models M, M-2 and M-3. Looking under the lower manual on the left hand end, a black wood end block will be observed. One half inch from the front of this block is a drilled hole. Within this drilling is a small metal tongue with a punched hole. Using either long nose pliers or a hook, this tongue can be moved in and out and it in turn moves the busbars. The upper manual shifter is in a similar place, but requires removal of the generator dust cover to gain access to it.

The key contacts are connected through resistance wires to the manual terminal strips. The manual wiring chart Figure 18, shows how the contact of each key are connected to the proper frequencies to supply the fundamental and harmonics of that particular key. The blank spaces indicate that no key contact is used, inasmuch as the highest harmonics of the highest keys are above the range of the tone generator and are not required. Since the percussion control tubes in the M-3 and M-lOO are keyed through the 6th harmonic busbar, the blank spaces in this row have contacts connected to ground through resistance wires.

The busbars of each manual, each one carrying a certain harmonic, are wired to the harmonic drawbars for that manual in the M, M-2, M-3 and through the "Drawbars" tab in the M-IOO-

HARMONIC DRAWBARS

The left group of eight (8) harmonic drawbars (Figure 19) is associated with the lower manual, and the right group of nine (9) drawbars controls the upper manual. By sliding these drawbars in and out, the organist is able to mix the fundamen^ tal and harmonics (or overtones) in various porportions. The distance a bar is pulled out determines the strength of the corresponding harmonic; and if a drawbar is set all the way in, the harmonic it represents is not present in the mixture. Neither manual will play unless at least one of its drawbars is pulled out at least part of the way in the case of the M, M-2, M-3, or with the "Drawbars^' tab pressed or preset tab pressed in the M-100.

The drawbars slide over nine (9) busbars , representing intensity levels, and each drawbar has two contacts connected together by a one ohm resistor. As the drawbar moves, at least one of the contacts is touching some busbar at all times, and therefore there is no "dead spot" in the drawbar motion. The one ohm resistor avoids an actual short circuit between adjacent busbars. These busbars extend the length of the drawbar assembly but are split in the middle to form two groups of nine (9)- Those in the left group, under the lower manual draw* bars, are connected to low impedance primary taps on the lower manual matching transformer. Similarly, those in the right group, under the upper manual drawbars, are connected to taps on the upper manual matching transformer- Signals from the high impedance secondaries of these two transformers go through the lower manual "Vibrato Cancel" and upper manual "Vibrato Cancel" tabs to the apraplif ier input terminals -

PEDAL DRAWBAR

The 12 (M, M-2, M-3) or 13 (M-100) playing pedals are operated by the left foot and are connected to the lowest 12 or 13 frequencies of the generator. The center drawbar adjusts the volume of the pedals. It operates a variable condenser (shown in Figures 3, 5, and 7) which is connected to the pedal section of the amplifier. For operation of the circuit see description of "amplifier,"

PEDAL KEYBOARD

The 13 playing pedals are operated by the left foot and are connected to the lowest 13 frequencies of the generator. Like the manuals, they have light and dark keys arranged in the standard octave pattern. Figures 20 and 21 identifies the pedals and shows the generator frequency number associated with each.

A "pedal contact" on each pedal opens when the pedal is pressed, thereby allowing the correct generator frequency to reach the amplifier. In addition there is a "pedal keying contact'' for all pedals, which closes when any pedal is operated. It serves to key the pedal amplifier, causing the note to sound at the desired rate-
When a pedal is pressed its "pedal contact" opens first, selecting the correct note. Immediately the "pedal keying contact" closes, causing the note to sound. When the pedal is released a mechanical latch keeps the "pedal contact" open, so that the last-played pedal note continues to sound for a length of time determined by the position of the pedal "Fast Decay" and "Pedal Legato" tabs in the M-100. In the M, M-2, and M-3; the time which the pedal sound is heard is determined by the setting of the "Pedal Decay" tablet and a "Pedal sustaining control" attached to the expression control. The electrical operation of these circuits is described under "amplifier"-

EXPRESSION PEDAL

The "expression" pedal, sometimes called "swell" pedal (Figures 1 , 2, 4, and 6) is operated by the player's right foot and varies the volume of both manuals and pedals together. It is connected mechanically to a special variable air condenser mounted on the amplifier. When the pedal is tilted back (closed) by pushing on the player's heel the music is softest, and when pushed forward (opened) by Che player's toe the music is loudest-

In the M, M-2, and M-3, attached to the expression pedal is a "pedal sustaining control" lever, which is operated by sliding the foot sldewlse on the pedal. If this lever is not pressed, each pedal note dies away rapidly or slowly, depending on the setting of the "pedal decay" tablet. If the lever is pressed to the left, the last-played pedal note dies away much more slowly,

CONTROL TABLETS

The Model M has 6, while the M-2 and M-3 have 7 of these control tablets and each has two positions (figures 1, 2 and 4). The "volume" tablet changes the overall volume and thus supplements the expression pedal. The "pedal attack" tablet determines how fast a pedal note sounds after a pedal is depressed, and "pedal decay" determines how fast the sound dies away after the pedal is released.

The "vibrato lower manual" and "vibrato solo manual" tablets turn the vibrato effect on and off independently on the lower and upper manuals respectively.

The next tablet provides a choice of "normal vibrato" or "vibrato chorus" (it is effective only when the vibrato effect is on). The last tablet can be set for "small" or "normal" vibrato to adjust the extent of the pitch variation provided by the vibrato mechanism,

The M-lOO has 24 tabs, each providing some change in the instruments operation. To have the instrument sound after turning it on, tabs such as "Full Organ" and "Ensemble" will place the upper and lower manual in operation. A tab is in use when in the down position. Functions of the various tabs from left to right as they appear on the instrument are given in the following paragraphs.

PERCUSSION CONTROL TABLETS

The M-3 and the M-lOO are the only two Models which contain percussion and each unit has four (4) associated tabs.

In the M-lOO, these tabs operate only when the upper manual "Drawbars" tab is pressed. Pressing either "Second Harmonic" or "Third Harmonic" will, when the Upper manual is played, cause the tone to sound percussively (in addition to sustained organ tones). Both tabs can be pressed, giving a combination percussive tone, "Fast Decay" causes the percussive tones to fade away with greater rapidity- "Percussion Soft" reduces the volume for the percussive signal.

In the M-3, when the "Percussion" on-off tablet is "On", the Solo (Upper) manual will play 2nd or 3rd harmonic tones percussively (in addition to the sustained organ tones). The "Volume" tablet in "Normal" position allows the per cussion tones to soilnd percussively as with the M-lOO and reduces the level of the Solo manual sustained organ tones to maintain proper balance between the manuals. In "Soft" position it allows the percussion tones to sound only softly and restores the full level of the Solo manual sustained organ tones. The "Decay" tablet determines how fast the percussion tones fade away when the Solo manual key is pressed.

Operation of the electrical circuits associated with the percussion feature are described in the percussion section of the amplifier theory.

VIBRATO TABLETS

The Model M vibrato uses three control tabs- Two degrees of vibrato are available with the "amount of Vibrato" tablet and the "Vibrato Chorus". A third tablet marked "Vibrato" turns the effect on or off.

The M-'2, M-3, and M-lOO have a selective vibrato system, using four (4) control tablets to vary the vibrato effect. On the M-lOO series only, an additional stop (Vibrato Cancel) to the right of the preset tabs permits any Vibrato effect to be cancelled immediately.

The vibrato effect is created by a periodic raising and lowering of pitch, and thus is fundamentally different from a tremolo, or loudness variation. It is comparable to the effect produced when a violinist moves his finger back and forth on a string while playing, varying the frequency while maintaining constant volume.

The Hammond Vibrato equipment (See Fundamental Diagram of Vibrato System, Figures 22, 25,26) varies the frequency of all tones (excepting the pedal and percussive tones) by continuously shifting their phase. It includes a phase shift network or electrical time delay line, composed of a number of low pass filter sections, and a capacity type pickup or scanner, which is motor driven so that it scans back and forth along the line.

Electrical waves fed into the line are shifted in phase by each line section (the amount per section being proportional to frequency), so that at any tap of the line the phase is retarded relative to the previous tap •

The scanning pickup traveling along the line will thus encounter waves increas^ ingly retarded in phase at each successive tap. As a shift in phase is equivalent to an instantaneous change in frequency, the continuous change in phase becomes a continuous frequency variation. Since the scanner sweeps from start to end of the line and then back, it alternately raises and lowers the output frequency, the average remaining equal to the input frequency.

The exact amount of frequency shift depends not only on the amount of phase shift in the line but also on the scanning rate. This rate, however, is constant because the scanner is driven by the synchronous running motor of the organ.

In the M, M-2, and M-3, the "Amount of Vibrato" tablet varies the amount of frequency shift by causing the whole line to be scanned for "Normal Vibrato" and only one fourth of it for "Small Vibrato".

In the M-lOO, the "Vibrato Small" Tablet varies the amount of frequency shift by causing two thirds of the line to be scanned, in contrast to the entire line when in the up position.

A vibrato chorus effect, similar to the effect of two or three slightly out-of-tune frequencies mixed together, is obtained when the vibrato output signal is mixed with a portion of signal without vibrato. This is accomplished by the "Vibrato Chorus" tab, which causes only part of the Incoming signal to appear across the vibrato line and the rest across a resistor in series with the line- As the vibrato effect is applied to the part of the signal appearing across the line but not to the part appearing across the resistor, the combination produces a chorus effect -

In the M-lOO, a Celeste effect is obtainable by the use ''Vibrato Celeste I" and "Vibrato Celeste II" tabs. These can be used independently or together. Use of these tabs introduces a resistor network at the far end of the Vibrato line, changing the termination impedance. This in turn causes a reflective signal to appear in the line, which is picked up by the scanner.

In the Model M, to remove the vibrato effect entirely, the 'Vibrato" tablet in "off" position places a very large resistor in series with the vibrato line. Practically all of the signal appears across this resistor and the vibrato effect is virtually eliminated. A compensation circuit consisting of Rl and CI maintains constant volume by introducing negative feedback with the "vibrato" tablet "off". (See Figures 23 and 24).

Figures 23 thru 26 show only the "Vibrato" channel of the amplifier. All tones sent through this channel have the vibrato effect. In the M-lOO, when vibrato is not desired on one manual or both, the "Vibrato Cancel" tabs in the down position feed their signals through the "no Vibrato" channel of the amplifier.

Figures 27, 28 and 29 show the vibrato line box. See figures 3, 5, and 7 for location of line box.

The scanner is mounted on the synchronous motor and driven at 412 revolutions per minute- It is a multi-pole variable condenser with 16 sets of stationary plates and a rotor whose plates mesh with the stationary ones. Figure 30 shows the construction of the scanner , with two sets of plates removed to show the rotor-
Signals coming from the vibrato line appear on the stationary plates and are picked up, one at a time, by the rotor. Connection to the rotor is made by carbon brushes as shown in Figure 30. Two brushes touch the sides of the contact pin and a third presses on the end, in order to eliminate the possibility of contact failure.

The complete electrical circuit of the vibrato system is shown in the schematic diagrams contained in the back of this manual-

PRESET TABS CM- 1 00)

Four tabs are provided for each manual. As indicated, they provide a choice of

using the drawbars or playing the preset tones indicated on them.

REVERBERATION AND VOLUME SOFT TABS CM- 1 00)

Several degrees of reverberation are obtained by the use of either or both tabs labeled ''Reverberation I" and "Reverberation II", These tabs in addition to turning this feature on, govern the loudness or amount of reverberation by a resistive network used in conjunction with the speaker. The "Volume Soft" tab controls the overall volume of the organ and is especially useful where playing might disturb others .

AMPLIFIER ASSEMBLY

In the M and M-2 models, the amplifier assembly is on a single chassis, but is actually composed of four sections: Manual, Pedal, Intermediate, and Output , as indicated in the block diagrams, figures 8 and 9, and in the schematics in the schematic section of this manual.

In the M-3 and M-lOO models there is one additional section, the percussion amplifier. The block diagrams appear in Figures 10 and 11,

The M-lOO model alone has one additional amplifier assembly, the Reverberation Amplifier. This separate amplifier is used to secure the Reverberation effect in conjunction with the Reverberation unit. This amplifier has its own speaker,

MANUAL SECTION OF AMPLIFIER MODEL M

The manual section, composed of tubes VI and VZ, receives its signal from the matching transformer Tl. The "special input" jack, connected through a network to the cathode of VI, provides a low impedance input circuit (see "Special Equipment")* Some treble attenuation is provided by a feedback network consisting of C2, R2, and R3, connected from cathode follower tube V2 to the input of VI, The output signal obtained from the cathode of V2 drives the vibrato line (see "Vibrato system") and the manual signal, after passing through the vibrato system, is combined with the pedal signal at the grid of V3.

MODEL M-2» M-3

The manual section is composed of two channels connected to the "Vibrato" and "no Vibrato" input terminals. Either of the two matching transformers can feed a signal into either input channel, depending on whether the corresponding control tablet is set for Vibrato "on" or "off".

Signals entering the "no Vibrato" channel (tube V2) are amplified and fed directly into the intermediate section of the amplifier while signals going into the "Vibrato" channel (tubes VI and V3) pass through the Vibrato system first- The output signal of the Vibrato system is combined with the "no Vibrato", Percussion^ and Pedal signals at the grid of the intermediate amplifier.

Suitable tonal balance is secured in the "no Vibrato" channel by a feedback network connected from plate to grid of V2. Similar tonal balance is provided in the "Vibrato" channel by a feedback network connected from cathode follower V3 to the gird of VI- The two channels are matched by selecting R27 (M-3), and R20 (M-2) at the factory-

M-100

The manual section is composed of two channels connected to the "Vibrato" and "no Vibrato" input terminals- Either of the two matching transformers can feed a signal into either input channel, depending on whether the corresponding control tablet is set for vibrato "on" or "off".

Signals entering the "no Vibrato" channel (tube V2) are amplified and fed directly into the intermediate section of the amplifier, while signals going into the "Vibrato" channel (tubes VI and V3) pass through the Vibrato system first. The output signal of the Vibrato system is combined with the "no Vibrato" and pedal signals at the grid of the intermediate amplifier.

Suitable tonal balance is secured in the "no Vibrato" channel by a feedback network consisting of C6, R12, R13 and R13A connected from plate to grid of V2. Similar tonal balance is provided in the "Vibrato" channel by a feedback network including CI, Rl, R2, and R2A connected from cathode follower V3 to the input of VI. The two channels are matched by selecting R20 at the factory.

PEDAL SECTION OF AMPLIFIER - Mi M-2i M-3

The pedal amplifier, composed of one tube, V7, receives its signal directly from the pedal generators. When a pedal key is pressed its "pedal contact" opens, delivering a signal voltage of the proper frequency to the grid of V7, The note cannot sound instanly, however, because the tube is normally cut off by a negative 21 volt grid bias.

Near the end of the pedal stroke the "pedal keying contact" (common to all pedals) closes. This shunts a resistance from the bias point to ground, discharging the bias condenser C57 and allowing the note to sound.

If "pedal attack" is at "normal" only a single resistor R68 is placed across the bias condenser when the pedal keying contact closes. This very quickly discharges the condenser, and the note sounds quickly, although not abruptly.

In case "pedal attack" is set at "slow"^ the shunting resistor is increased by

the addition of R69 and so the bias condenser cannot discharge as quickly- It

takes an appreciable time, therefore, for the bias to drop low enough so that the note sounds .

When the pedal key is released, the pedal keying contact opens, allowing cutoff bias to be applied again to the tube. With "pedal decay" set at "fast" this occurs rapidly, since R74 charges C57 in a short time. With "pedal decay" set at "normal" the increased resistance delays the charging of C57 and permits the tone to sound for a longer time.

If the "pedal sustaining control" is operated (lever on expression pedal pressed to left), an additional resistor R76 is introduced. This delays the charging of C57 still further and causes the note to sound for a much longer time.

A latching mechanism holds the last-played pedal contact open until some other pedal is operated, in order to Insure that the correct note will sound throughout the decay period.

The pedal cutoff adjustment R73 varies the screen voltage of the pedal amplifier tube. It must be adjusted so that the pedal tone is just inaudible with the pedal drawbar and expression pedal set in loudest position, as instructed in "Practical Service Suggestions".

M-lOO

The pedal amplifier, composed of one tube, VIO, receives its signal directly from the pedal generators- When a pedal key is pressed its "pedal cqntact" opens, delivering a signal voltage of the proper frequency to the grid of VIO.

+

The note cannot sound instantly, however, because the tube is normally cut off by a negative 22 volt grid bias.

+

Near the end of the pedal stroke the "pedal keying contact" (common to all pedals) closes. This shunts a resistance from that bias point to ground, dis ^ charging the bias condenser C57 and allowing the note to sound.

When the pedal key is released, the pedal keying contact opens, allowing cutoff bias to be applied again to the tube. With the pedal "Fast Decay" tab depressed this occurs rapidly, since R81 charges C57 in a short time. With the tab up, the increase resistance delays the charging of C57 and permits the tone to sound for a longer time.

If the "Pedal Legato" stop Is depressed, an additional resistor R82 is introduced. This delays the charging of C57 still further and causes the note to sound for a much longer time.

A latching mechanism holds the last-played pedal contact open until some other pedal is operated, in order to insure that the correct note will sound throughout the decay period.

The "Bass Mute" tab varies a filtering circuit in the VIO tube output so the higher frequencies are bypassed to ground, giving a deeper tone to the pedals.

The pedal cutoff adjustment R85 varies Che bias voltage of the pedal amplifier tube. It must be adjusted so that the pedal tone is just inuadible with the pedal drawbar and expression pedal set in loudest position, as instructed in "Practical-Service Suggestions. "

To prevent a pedal note from sounding when the organ is first turned on, a resistance of five ohms inserted in series with the heater of the pedal amplifier tube lengthens its warm-up time so that the cutoff bias is applied before the tube is conductive.

INTERMEDIATE SECTION OF AMPLIFIER

From the plate of the pedal amplifier tube the pedal signal passes through a variable air condenser (operated by the pedal drawbar) to the intermediate amplifier (half of V3)(M), V4 (M-2, M-3, M-lOO) . At this point the pedal signal is mixed with the vibrato, non-vibrato, and percussion signals from the manuals (M-3, M-lOO).

Depressing the "Volume Soft" tab reduces the overall volume of both manuals and pedals by shunting a small condenser across the input of the intermediate amplifier. At the same time it provides pedal compensation by adding R65 in series with the pedal generators and thereby increasing the relative volume of the pedals-

The small feedback condenser from plate to grid of the intermediate amplifier is a means of increasing the effective input capacity of the tube. In this circuit the effective input capacity is this value multiplied by the amplification factor of the tube, or a total of about 1500 micromicrof arads , This provides a suitable load for the output of the scanner and the pedal drawbar,

The combined manual and pedal signals go through the intermediate amplifier to the expression control (operated by the expression pedal), which is a special variable air condenser with a single set of movable plates and two sets of stationary plates. With the expression pedal in "loud" position the signal is transitted directly to the grid of the following tube, while in "soft" position the signal goes through a tone^compensated attenuating network. At intermediate positions the signal is obtained from both sources, providing continuously variable control,

OUTPUT SECTION QF AMPLIFIER (M)

V4 is a common-cathode-impedance phase inverter driving push-pull output tubes V5 and V6* The second grid of V4 provides a radio-phonograph input channel (see "Special Equipment"). A small feedback condenser from voice coil to grid of V4 makes the pedal response more uniform by reducing speaker resonance. (In model M consoles below serial number 3000, with amplifiers marked type M-A, this feedback connection is not used; C46 is omitted, C37 is omitted, C42 is .00135 mfd,,

and T2 does not have a secondary center tap)

M-2i M-3

The second half of V3 is a phase inverter driving push-pull output tubes V5 and V6. A small feedback condenser C22 Cm-2), C23 (M-3) from voice coil to grid of V4 makes the pedal response more uniform by reducing speaker resonance. This condenser (located in the expression control unit) is variable and is adjusted at the factory.

M-lOO

The second half of V3 is a phase inverted driving push-pull input tubes V5 and V6, which in turn drive two 16 ohm speakers connected in parallel, A small feedback condenser C23 from output transformer secondary to grid of V4 makes the pedal response more uniform by reducing speaker resonance. This condenser (located in the expression control unit) is variable and is adjusted at the factory.

PERCUSSION SECTION OF AMPLIFIER

The 2nd or 3rd harmonic signal (M-3) or both (M-lOO) (depending on position of the harmonic selector tabs) is conducted through the percussion matching transformer and amplified by tube V7. The resistive feedback on this tube provides proper loading on the matching transformer to fix the primary impedance at about 5 ohms. This provides a volume compensating effect so that the percussion output signal is about the same whether one key or several are played. Besides providing push-pull signal for the control tube (V9), transformer T5 has another winding which feeds signal to the 2nd or 3rd harmonic drawbar through equivalent key circuit resistors.

The control tube (V9) is normally conducting, so when a key is pressed the second or third harmonic percussion signal first sounds loudly. It passes through the control tube, transformer T6, a band pass filter network, and terminal D to the grid of V4,

Imrr.ediately the note begins to fade away, giving the characteristic percussion effect. This fading Is accomplished as follows: When the percussion switch is "on'', terminal K (normally held at plus 25 volts through anti-spark resistor (R-53) is connected to the solo manual 6th, (8th in M-3) harmonic busbar* When a key is pressed, terminal K is grounded through the key contact and the tone generator filter. This virtually grounds the plate of V8 (connected as a diode), open-circuiting the tube and isolating the control tube grid circuit. The grids then drift from their operating potential of about plus 25 volts to a cut-off potential (about plus 15 volts) at a rate determined by the time required for 031 to discharge through R59 and R60-

The percussion signal is now blocked. No percussion notes can sound until all keys of the solo manual are released and the control grids again rise to plus 25 volts. The time of this rise (that is, how quickly the control tubes turn on again after a key is released) is the time required to change C31 to plus 25 volts through R57 and R58.

"^

16

When the percussion Second Harmonic" or Third Harmonic" (>i-3) or both (M-lOO) tabs are down, the corresponding upper manual harmonic drawbars are disconnected from their lead wires and these wires (which come from the manual busbars) are connected to the percussion matching transformer. The 6th harmonic (M^lOO) or 8th (M^3) drawbar is also disconnected from its lead wire and this wire (which is grounded through the generator magnets when any key is pressed) is used to turn off the push-pull control tube. Therefore, the 6th harmonic (M-lOO) or 8th (M-3) is not available on the upper manual when the percussion is in use.

When the "Percussion Soft" tab is depressed, it reduces the volume by shunting resistor R50 across the percussion output transformer.

The percussion "Fast Decay" tab determines how fast the sound fades away after a k-ey is pressed. When a key is pressed with the tab up, resistor R60 discharges capacitor C31, reducing the D,C. voltage on the control tube grids to cutoff in about 2-1/2 seconds. When the tab is pushed down another resistor is shunted across the original resistor R60, reducing the time to discharge capacitor C31 and thereby reducing the D.C. voltage on the control tube grids to cutoff in less than 1/2 second. To preserve about the same effective loudness between "slow" and "fast" decay settings, shunt resistor R62 is disconnected when the decay tab is in "fast" position. This reduces the effective control tube bias and thus increases the loudness.

With the "Second Harmonic" tab depressed, the upper manual 2nd harmonic drawbar wire is connected to the percussion matching transformer and a signal is fed back to the 2nd harmonic drawbar- With the "Third Harmonic" tab depressed the upper manual 3rd harmonic drawbar wire is connected to the percussion matching transformer and a signal is fed back to the 3rd harmonic drawbar. Both tabs can be used at the same time in the M-lOO, however in the M-3, only one or the other is available.

POWER SUPPLY (ALL MODELS)

The power supply uses a 5U4 rectifier tube with a conventional filter circuit.

TUBE SOCKET VOLTAGES

Voltages shown on the schematics are taken with a 20,000 ohm-per-volt meter.

Line variations may cause up to 20% variation in the indicated voltages.

To make tube sockets accessible, remove lever from shaft of expression unit on amplifier; loosen cable clamp on lower shelf; remove four amplifier mounting screws and turn amplifier upside down, being careful not to rest on expression unit lever. The tabs and expression lever may be in any position, and no key should be depressed unless specified,

REVERBERATION AMPLIFIER (M-100)

When either "Reverberation I," "Reverberation II," or both are used, the music played will be reverberated. This reverberation signal is in addition to the normal sound produced through the two 12" speakers connected to the main amplifier. A separate amplifier and speaker are incorporated in the instrument for this purpose,

A signal from the voice coil terminals of the regular speakers in the console goes through a resistor network and two incandescent lamps to the drive coils of the reverberation unit, as shown under "input to reverberation unit" in the schematic diagram.

The incandescent lamps are used as volume limiters or volume compression circuit. When the organ is played loudly, the lamp filaments become hot and increase in resistance, and, therefore, the amount of signal furnished to the reverberation unit does not increase as fast as the volume of the no-reverberated signal. This is a desirable musical effect, since a greater proportion of reverberated signal is needed at low volume levels.

The drive coils introduce vibration in two coil springs. These vibrations bounce back and forth in the coils springs to simulate natural echoes of sound, in a large room. Pickup coils at the other end of the two springs drive the input of the amplifier. The amplifier output drives an 8 ohm 8" speaker.

SPECIAL EQUIPMENT

RADIO. PHONOGRAPH. OR MICROPHONE

A phonograph, radio, or microphone amplifier will play through the organ speaker if connected to the pin jack marked "RADIO-PHONO" located on the expression control unit of the organ amplifier. The device should have an output level of about 1/2 volt maximum, and must have its own volume control, as neither the expression pedal nor the "Volume" tablet will affect it. The organ may be played at the same time.

In the Model M only, occasionally for special effects it may be desirable to apply vibrato to the signal from a phonograph, radio or microphone. In this case connect to the pin jack marked "SPEC-INPUT". This point has a low impedance to ground (about 7000 ohms) and may conveniently be driven from the voice coil terminals of an amplifier having a level of about 5 volts maximum. The expression pedal, "volume" tablet, and three vibrato tablets will then be effective on the input signal just as they are on the organ music.

EXTENSION SPEAKER

An additional speaker, of the permanent magnet dynamic type, may be attached to the organ if special circumstances make it desirable. It should be connected to the two voice coil terminals on the amplifier. It is essential that the speaker be at least 10" in diameter and be mounted in an adequate baffle to bring out the organ pedal notes properly. The console speaker voice coil wires may be left connected or not, as desired.

Hammond Organ tone cabinets may be used as extension speakers. A kit for making the necessary connections can be secured from your dealer.

EAR PHONE (MONAURAL)

Ear phones may be connected to the organ if someone wishes to practice without disturbing others. They will generally give adequate volume when connected to the^ voice coil" terminals of the amplifier, with the speaker disconnected. A resistor of 6 to ID ohms, with power rating not less than 10 watts must be connected across these terminals whenever the speaker is disconnected.

EAR PHONE (STEREO)

Stereo ear phones can give pleasing results when attached as shown in the schmatic below. A separate two pole double throw switch is required in addition to the listed resistors and jack. Use of good quality ear phones made by David

Clark, Koss, or Telex are recommended and can be secured from any parts supply house.

GN.

T^J

Organ Spk, wires

BLK,

CN, ©-

Rev, Spk. wires

BLK- *■

£:-3

100 -a

10 jo.
10 W

SPECIAL POWER SOURCES

The organ must always be connected to an alternating current source of the voltage and frequency specified on the name plate. If the only available power source is direct current or has a frequency different from that specified, it will be necessary to provide a converter or motor generator of at least 170 watts capacity.

PRACTICAL SERVICE SUGGESTIONS

ORGAN DOES NOT PLAY

(a) If the starting motor does not operate when the "Start" switch is pressed and If the tubes do not light with the'^Run'' switch on, check the power wiring, power switch, line cord, line cord plug, and wall outlet.

(b)

If the generator turns and the tubes light, but no sound can be obtained with all controls in playing position, the most likely source of trouble is the amplifier. In most respects this is a conventional amplifier circuit, and the schematic diagrams will enable the service man to locate the trouble.

ONE KEY DOES NOT PLAY OR A HARMONIC IS MISSING

(Tests to be made with "Drawbars" tab depressed)

This may mean a dirty key contact, a broken connection, or a dead note in the

generator. The steps below will serve to isolate the trouble-

(a) Ordinarily only one of the several frequencies used on the key will be missing. This can be determined by holding the key and operating each drawbar for that manual, observing on which drawbar the key falls to play Reference to the manual wiring chart, figure 18 will tell which frequency number is missing.

(b) See whether the same frequency is missing where it is used on other keys of the same manual. The wiring chart will tell with what other key and

what other drawbar you should get the same frequency. If It is missing on one key but not on others, a key contact is probably dirty. In some cases it may be cleared by striking the key 15 or 20 times in a rapid staccato manner to loosen the dirt. If this procedure is not effective, adjustment of the busbar shifter for that manual will clear it, (See "manuals" section on a prior page for location and manner of adjustment). This will slide the busbars endwise so they present a clean contact surface. In extreme cases, it may be necessary to hold down the faulty key while making the adjustment,

(c) If the frequency is missing on all keys of one manual but not on the other manual, look for a break in the cable connecting one manual to the other.

(d) If the frequency is missing on both manuals, check the manual-to-generator cable or the generator itself.

(e) The output of any signal frequency on the tone generator may be checked by pulling out any drawbar and connecting a clip lead from the back end of the drawbar to the generator terminal in question. See Figures 14, 15, and 16 for location of all generator terminals. If the generator Is all right, the note will play loudly.

CAUTION; Never test the tone generator with an outside source of current such as a continuity meter, as serious damage may result to the sensitive filter transformers and permanent magnets. By the above method, all necessary tests of the tone generator may be made with the current supplied by the generator itself.

(f) If it fails to play, try touching the clip to the input side of the filter coil (not the grounded tap) and the input side of the filter condenser (Figures 14, 15 and 16) in order to check these parts. Disconnect the condenser to eliminate the possibility of a grounded transformer . If the signal is still missing at the magnet coil terminal, it means that the tone wheel is not turnings the coil is defective, or the magnet is not properly adjusted.

(g) If the tone wheel is not turning^ the frequency of the other wheel on the same shaft will also be missing (with the exception of a few wheels which are alone). On the generator magnet location drawing (Figure 13), the two frequencies whose numbers are connected by a dotted line are on the same shaft. Antoher way to check the wheel is to raise the generator slightly and feel the wheel with your finger to see if it is turning. Each wheel is located directly behind its magnet, shown in Figure 13.

(h) If the magnet coil is defective, the generator must be returned to the factory, as replacement of a coil necessitates dismantling the entire generator,

(i) It is possible, although unlikely, that the magnet may have become loose and moved so far from the wheel as to make the not inaudible. It may be adjusted as described in the following paragraph.

ONE NOTE IS WEAK

(a) Trace the note as described in the preceding section to see whether weakness is due to dirty contact, poor connection, defective filter or reduced output of magnet coil. Check at each point by comparing intensities with higher and lower frequency numbers.

(b) It is possible that one or more notes may be acoustically weak, due to the room and the furnishing, although the actual signal level is equal to that of adjacent notes. This can be checked by reading voltages of the various notes on an output meter connected to the voice coil terminals on the amplifier. All notes will not give equal output, but voltage should vary smoothly from note to note. In this test variations of less than 30% should be ignored

(c) Each magnet is set at the factory by tapping it gently, with the set screw partially loosened, while observing an output meter. Experience has shown that the magnets seldon need adjustment and that setting them without proper equipment involves danger of damaging both magnet and wheel. Therefore, it is not recommended that the service man attempt this adjustment.

PERCUSSION NOTES WEAKt DO NOT PLAYi OR DO NOT DECAY PROPERLY

(a) Adjust percussion cutoff control; with expression pedal wide open, "Volume Soft" tab up, upper "Drawbars" tab down, all drawbars pushed in, press "Third Harmonic" and "Fast Decay" tabs. Hold down first C key on upper manual and adjust percussion cutoff control to the exact point of cutoff or silence,

(b) Check tubes V7, V8, V9-

(c) Always adjust percussion cutoff control after replacing V9 C12AU7).

PEDAL NOTE SOUNDS AT FULL VOLUME (WHEN PEDAL IS NOT BEING PLAYED)

(a) It is possible to make a black pedal lock down and play continuously by striking it very hard at an angle so that it moves sidewise as well as downward. This will never occur if the pedals are used properly, as only slight pressure with the toe is required for playing.

(b) A pedal locked down in this way will remain visibly depressed and tilted. It can be released by pressing it down very hard, with a slight pressure opposite to the direction of tilt. No permanent damage will result.

PEDAL NOTE SOUNDS FAINTLY (WHEN ORGAN IS NOT BEING PLAYED)

In this case the pedal cutoff control may be adjusted as follows:

(a) Set expression pedal wide open, pull pedal drawbar to its loudest position, and leave three pedal tabs up.

(b) Play highest pedal key and then release it. Wait at least 15 seconds for pedal note to die away.

(c) Slowly turn pedal cutoff adjustment (on face of amplifier) clockwise until pedal note just disappears. Do not turn it any farther.

(d) Always recheck this adjustment when replacing the 6BA6 tube.

HUM

(a) A loud 60 cycle or 120 cycle hum in the speaker may come from some nearby electrical appliance, as explained on the instruction card. It may be picked up by the matching transformer, the vibrato line, or the console wiring. Hum from this source will disappear if you ground the signal input terminals on the amplifier to the chassis. It may be eliminated by moving either the console or the appliance.

(b) The faint pedal note heard when the pedal cutoff adjustment needs setting may sometimes be mistaken for hum. Check it as described under "Pedal note sounds faintly when organ is not being played.

(c) Any other hum must originate in the amplifier circuit, and can generally be cured by replacing one or more of the electrolytic condensers.

(d) In case hum originates in the amplifier but is not due to the electrolytic condensers, its source can be isolated by successively removing tubes or by grounding successive points in the signal circuit ,

REPLACING TUBES

(a) The vacuum tubes are all standard radio types and can be tested in the usual way.

(b) If the 6BA6 tube is replaced, check the pedal cutoff adjustment as explained under "Pedal note sounds faintly when organ is not being played",

(c) If tube V9 is replaced, check percussion cutoff adjustment as explained under "Percussion notes weak, do not play, or do not decay properly".

PROCEDURE FOR REMOVING PARTS IN NEED OF REPAIR OR REPLACEMENT

TO REMOVE KEY FROM UPPER MANUAL (Mi M-2i M-3)

(a) Remove music rack by unscrewing thumb screw, unhooking brace, and lifting it from console.

(b) Remove music rack base by taking out two screws in upper manual end blocks,

(c) Remove metal angle fastened across keyboard by two screws -

(d) To remove a black key loosen its key mounting screw (See Figure 3), unhook key from screw and lift out key.

(e) To remove a white key loosen its key mounting screw and those of adjacent black keys. Unhook these keys from screws, push them back, and lift out white key,

M-lOO

(a) Remove music panel and top.

(b) Remove four screws which secure metal cover on control panel assembly,

(c) Remove two large screws located at ends of control assembly, which secure It to upper manual.

(d) Pull out drawbar on extreme left and fold control assembly back,

(e) To remove a black key, loosen its key mounting screw (See Figure 7), unhook key from screw and lift out key.

(f) To remove a white key, loosen its key mounting screw and those of adjacent black keys. Unhook these keys from screws, push them back, and lift out white key.

TO REMOVE A KEY FROM LOWER MANUAL (Mi M-2i M'3)

(a) Remove music rack by unscrewing thumb screw, unhooking brace, and lifting it from console.

(b) Remove music rack base by taking out two screws in upper manual end blocks-

(c) Detach pedal volume control (Figure 3) by removing two machine screws, loosening wood screw which holds friction clip to top of console, and unhooking from drawbar.

(d) Remove upper manual mounting bolts "A" and "B" under keyboard (Figure 33)

(e) Place a 3/4" board under each upper manual chassis mounting block; this will hold up upper manual sufficiently to make lower manual key mounting screws accessible,

(f) To remove a black key loosen its key mounting screw (See Figure 3), unhook key from screw and lift out key.

(g) To remove a white key loosen its key mounting screw and those of adjacent black keys. Unhook these keys from screws, push them back, and lift out white key,

M-lOO

(a) Remove music panel and top

(b) Remove generator dust cover by taking out seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly

(c) Remove upper manual mounting bolts (2) which are located at ends of console directly above front corners of generator.

(d) Remove two screws which pass through angle brackets into upper manual.

mounted on inside of cheek blocks. These screws are accessible from front of organ.

(e) Tilt manual from front, being careful that It does not slip back.

(f) Using 1/4" box ratchet, loosen key mounting screw,

(g) To remove a black key, loosen its key mounting screw (see Figure 7), unhook key from screw and lift out key.

(h) To remove a white key loosen its key mounting screw and those of adjacent black keys. Unhook these keys from screws, push them back, and lift out white key.

TO REMOVE A DRAWBAR CONTACT SPRING (Mj M-2i M-3)

(a) Push drawbar all the way in-

(b) Remove screw and nut at back end of drawbar (Figure 3).

(c) Pull out contact spring while pressing with thumb to release pressure on contact. To disconnect spring entirely, unsolder wire.

(d) Do not under any circumstances pull drawbar forward while contact spring is off, as damper spring will catch in slot and ne'cessitate removal of entire drawbar assembly .

M-lOO

(a) Remove music panel and top.

(b) Remove four screws which secure metal cover on control panel assembly,

(c) Pull out contact spring while pressing with thumb to release pressure on contact. To disconnect spring entirely, unsolder wire.

(d) Do not under any circumstances pull drawbar forward while contact spring is off, as damper spring will catch in slot and necessitate removal of entire drawbar assembly.

TO REMOVE A DRAWBAR OR DRAWBAR KNOB (Mi M-2i M-3)

(a) Remove music rack by unscrewing thumb screw, unhooking brace, and lifting it from console,

(b) Remove music rack base by taking out two screws in upper manual end blocks

(c) Remove 8 hexagonal head machine screws holding drawbar assembly and one screw fastening angle across upper manual keys ,

(d) To remove knob , pull drawbar assembly toward front of console (be careful not to scratch control panel surface) , prop it up, and remove screw which holds knob .

(e) To remove drawbar and contact spring, pull them out at back of assembly, while pressing with thumb to release pressure on contact.

(f) To separate drawbar from contact spring remove screw and nut at back end of drawbar.

M-lOO

(a) Remove music panel and top.

(b) Remove four screws which secure metal cover on control panel assembly.

(c) Remove two large screws located at ends of control assembly which secure It to upper manual (Pull out drawbar on extreme left) and fold back.

(d) Remove 4 hexagonal head machine screws holding drawbar assembly,

(e) To remove knob, pull drawbar assembly toward front of console (be careful not to scratch control panel surface) , prop it up, and remove screw which holds knob.

(f) To remove drawbar and contact spring, pull them out at back of assembly, while pressing with thumb to release pressure on contact,

(g) To separate drawbar from contact spring remove screw and nut at back end of drawbar -

TO REMOVE UPPER MANUAL (Mi M-2i M-3)

(a) Remove music rack by unscrewing thumb screw, unhooking brace, and lifting it from console .

(b) Remove music rack base by taking out two screws in upper manual end blocks.

(c) Remove dust cover over generator by taking our seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly -

(d) Detach control panel by removing 6 machine screws from top of panel, and lay panel on generator, being careful not to damage generator wiring. Control panel wires need not be disconnected.

(e) Detach pedal volume control (Figure 3) by removing two screws which hold it and loosening wood screw which holds friction clip to top of console; unhook control from drawbar and lay it on generator, being careful not to damage generator wiring. Volume control wires need not be disconnected,

(f) Remove two screws fastening matching transformer bracket to upper manual, take off round cover held by two screws, unsolder and detach shielded wires and black wire from transformer,

Cg) Re-attach matching transformer to upper manual.

(h) Unsolder wires from lower manual drawbars.

(i) Remove upper manual mounting bolts "A" and "B" under keyboard (Figure 33).

(j) Remove the two upper manual stop plates, held by two wood screws (Figure 3).

(k) Prop up front of upper manual so that its terminal strip is accessible. Be careful when raising and lowering manual that its terminal strip is not damaged by rubbing lower manual keys ,

(1) Unsolder manual cable from terminal strip. Lower manual into normal position,

(m) Detach vibrato line box by removing two screws in sides of box fastening it to underside of console top; lay line box on top of generator, being careful not to damage wiring on generator. Line box wires need not be unsoldered (early M-3 only) ,

(n) Where line box is of metal construction unsolder wires from scanner leaving it attached to manual.

(o) Carefully lift manual assembly (including drawbars and matching transformer) out through back of console,

(p) Remove metal angle fastened across keyboard by two screws.

(q) Take out 8 hexagonal head machine screws from drawbar assembly and carefully lift off drawbar assembly and matching transformer assembly.

M-lOO

(a) Remove music panel and top,

(b) Remove four screws which secure metal cover on control panel assembly.

(c) Remove two large screws located at ends of control assembly which secure it to upper manual.

(d) Remove generator dust cover by taking out seven screws from edge of generator shelf and loosening four screws in cover just below manual assembly,

(e) Remove two manual ho Id- down bolts located at ends of console directly above front generator corners - Reinstall dust cover temporarily,

(f) Remove two screws fastening matching transformer bracket to upper manual,

(g) Detach pedal volume control by removing two screws which hold it to manual assembly. Unhook control from drawbar and lay it on generator cover. " Volume control wires need not be disconnected ,

(h) Remove vibrato line box by taking out four screws attaching it to rear of upper manual.

(i) Remove screws holding four plastic clamps containing wiring.

C j) Locate nine coded wires coming from busbars inside manual, Tehse are found at right rear of manual. Trace this troup of wires to upper manual preset tabs and unsolder. Note location and routing as shown on wiring diagram and in console-

(k) Take out four hex head machine screws from drawbar assembly.

(1) Entire control panel, drawbar assembly, line box, pedal volume control and matching transformer can now rest on generator cover.

(m) Reinsert two bolts which held the control assembly to the manual assembly,

(n) Remove two screws which pass through angle brackets into upper manual.

Co) Prop up front of upper manual so that its terminal strip is accessible.

Be careful when raising and lowering manual that its terminal strip is not damaged by rubbing lower manual keys-

(p) Unsolder manual cable from terminal strip. Lower manual into normal

position-
(q) Carefully lift manual assembly out of console.

t

TO REMOVE LOWER MANUAL (Mi M'2» M-3)

(a) Remove music rack by unscrewing thumb screw, unhooking brace, and lifting it from console.

(b) Remove music rack base by taking out two screws in upper manual end blocks.

(c) Remove dust cover over generator by taking out seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly.

(d) Loosen wood screw holding friction clip of pedal volume control (Figure 3) to top of console,

Ce) Remove upper manual mounting bolts "A" and "B" under keyboard. (Figure 33)

(f) Prop up front of upper manual as far as possible. Be careful when raising and lowering upper manual that its terminal strip is not damaged by rugging lower manual keys.

(g) Remove two hexagonal head mounting bolts from rear end of lower manual chassis mounting blocks.

(h) Remove three screws X, Y, Z under keyboard (Figure 33).

(i) Remove lower manual end blocks by taking out screws C, D, E, and F under keyboard (Figure 33) ,
(j) Unsolder manual cable wires from terminal strip,
(k) Lift manual out through front of console, being careful not to damage woodwork.

M'lOO

(a) Remove screws holding four plastic clamps containing wires, on rear of upper manual.

(b) Locate nine coded wires coming from busbars inside of lower manual- These are found at right rear of manual. Trace this group of wires to lower manual preset tabs and unsolder. Note location and routing as shown on wiring diagram and in console.

(c) Prop upper manual from front, being careful it does not slip back.

(d) Remove both lower manual end blocks, by removing two screws through manual frame and one screw through bracket in check block.

(e) Remove lower manual terminal cover, hedl by four screws under keyboard.

(f) Remove two hex bolts which secure lower manual to case.

(g) Loosen (don't r^tnove) four hex screws holding front of lower manual to front rail of case.

(h) Lif t out lower manual .

TO DETACH AND OPEN CONTROL PANEL (Mi M-2» M-3)

(a) Remove dust cover over generator by taking out seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly-

(b) Remove six machine screws from top of panel. Control tablet box may now be lowered and pulled toward rear of console.

(c) Lay box upside down on generator (being careful not to damage wiring on generator) and remove bottom cover by taking out four screws. Care should be taken not to pull the wires or cables excessively during this procedure. None of the wires or cables need be disconnected.

TO DETACH A^a3 OPEN PERCUSSION CONTROL SWITCH (M-3 ONLY)

(a) Remove screws C and D under keyboard (Figure 33) .

(b) Remove four fastenings holding panel to wood block.

(c) Turn tablet assembly upside down and remove bottom cover by taking out two screws . Wires need not be disconnected .

TO REMOVE GENERATOR <Mt M-2» M-3j M-IOO) FIRST PULL OUT LINE PLUG

(a) Remove dust cover over generator by taking out seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly,

(b) Unsolder, at line panel, six wires (5 wires on M, M-2, M-3) to running and starting switches .

(c) Unsolder, at line panel, three wires to amplifier,

(d) Unsolder pedal and manual cables from generator,

(e) Disconnect scanner shielded wire from amplifier terminal.

(f) Unsolder cable of six green wires from scanner terminals.

(g) Unsolder scanner wires from terminals 3, 4, and 5 (12, 13, and 14 on M, M^2, M-3) on vibrato line box.

(h) Unsolder two black wires from generator cover near start motor end, and also grey wire (connected to junction of two carbon resistors on generator cover) ,

(i) Remove 4 generator hold down screws (4 cotter pins from clamping screws and remove screws on M and M-2).

(j) Unhook four suspension springs from generator.

(k) Carefully lift out generator.

TO REMOVE STARTING MOTOR (Mt M-2> M-3i M-lOO) FIRST PULL OUT LINE PLUG

(a) Remove dust cover over generator by taking out seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly.

(b) Remove oiling threads (tied to two motor bearings) from oil trough by pulling or cutting them, (When replacing threads be sure they go under felt in trough) .

(c) Provide more slack in lead wires at starting motor by pulling wires carefully,

(d) Unscrew two hexagonal studs extending beyond outer edge of motor.

(e) Lift motor out and unsolder its lead wires- (Be careful to remove and replace all threads).

TO REPLACE PILOT LIGHT (M-lOO ONLY)

(a) Remove music panel and top.

(b) Remove four screws which secure metal cover on control panel assembly.

(c) Lift fiber shield over bulb and replace bulb.

NOTE; Use No. 12GE 6.3V .ISA Minature 2 pin.

TO REPLACE A BROKEN TAB CM- 100 ONLY)

(a) Remove music panel and top,

(b) Remove four screws which secure metal cover on control panel assembly,

(c) Remove two Phillips screws from front of control panel that hold bank of switcht^s associated with tab to be replaced.

(d) Remove lock washer from either end of switch assembly, and pull rod out so it just clears broken tab- It may be necessary to tilt assembly so that free end of rod will clear adjacent switch assembly,

(e) Remove remains of broken tab and insert new piece,

NOTE; A small bronze spring washer will be found between tab and one side of switch assembly. Be sure this is reinserted with new tab.

TO REMOVE VIBRATO LINE BOX (Mt M-2i M-3t M-IQO)

(a) Unsolder wires from line box terminals ,

(b) Remove two screws in bottom edge of box fastening it to underside of console top- On later units, remove four screws fastening it to rear of upper manual.

TO REMOVE PEDAL KEYBOARD (M, M-2i-M-3i M-lOO)

(a) Remove dust cover over generator by taking out seven screws from edge of generator shelf and loosening four screws in cover just below upper manual assembly-

(b) Unsolder pedal cable from generator.

(c) Remove three pedal keyboard twisted wires from amplifier terminal panel,

(d) Place suitable wooden strips under pedal keyboard assembly to support it when screws are removed. First remove two screws in back of console (Figure 3), and then remove three screws on lower shelf toward front of console over pedal keyboard.

NOTE: It may be necessary to remove two speakers to take out these

latter mentioned screws.

(e) Lift console and pull out keyboard and strips- (When re-installing pedal keyboard replace two screws in back of console first, leaving these screws loose until remaining screws are replaced),

TO REMOVE EXPRESSION PEDAL (M, M-2» M-3- M-lOO)

(a) Disconnect two twisted wires from "SUS SW" terminals on amplifier, (Model M, M-2) terminals "W" and "X'' on M-3) .

(b) Prop up right end of console at least 6 inches from floor.

(c) Unhook coil spring from expression unit arm.

(d) Remove screw linking expression unit on amplifier to expression pedal.

NOTE FOR M-3 ONLY
A change in all amplfiier coded ''H'' and above removes the positive voltage from the stators of the swell assembly- This can be incorporated in earlier amplifiers by following the steps below. The end result will place a block-condenser (,02mfd-600V) between pin 1 of the 12AX7 and the swell stators- This change will insure con^ tinued noise free operation of earlier amplifiers.

SEE FIGURE 36A OF SERVICE ^L\NUAL

STEP #1 - Move lower lead of C16 from lug B to lug A, Remove jumper,
STEP t/2 - Move lower leads of R33, R35, C16 and green lead from lug C

to lug B-
RTEP //3 - Move lower lead of R32, Cl5 and blue lead (C15 from ^ ug D to lug C)
STEP H - Add C9 from lug C to D.

LOWER
MANUAL

DRAWBARS

DETACHABLE
MUSIC RACK

UPPER on

SWELL MANUAL

CONTROL

TABLETS

Expression

(volume) pecal

FRONT VIEW OF CONSOLE-MODEL M ORGAN

FIGURE 1

DIMENSIONS:
AC INPUT:

OUTPUT:
WEIGhfT:

45-5/8" wide; 25-3/8" DEEP; 42"HIGH

103 WATTS

11 WATTS E^I.A.

249 LBS,

27

LOWER

MANUAL

DRAWBARS

PEDAL

UPPER
MANUAL

MIDDLE

DETACHABLE
MUSIC RACK

UPPER OR
SOLO MANUAL

CONTROL
TABLETS

EXPRESSION
(VOLUME) PECAL

FRONT VIEW OF CONSOLE - MODEL N4-2 ORGAN

FIGURE 2

DIMENSIONS:
AC mPUT:

OUTPUT:
WEIGHT:

45-5/8" wide; 25-3/8" DEEP! 42" HIGH

103 WATTS

11 WATTS E.I. A.

249 LBS-

28

SYNCHRONOUS MOTOR

MUSIC RACK BRACE

PEDAL VOLUME CONTROL

MANUAL

STOP

PLATE

VIBRATO
SCANNER

LINE
WNEL

DRAWBARS

MATCHING
TRANSFORMER

STARTING
MOTOR

PEDAL
CABLE

GENERATOR
CLAMPING SCREWS

LINE CORD

EXPRESSION
CONTROL UNIT

TONE
GENERATOR

PEDAL I^EYBOARO
MOUNTING SCREWS

es)

'BACK VIEW OF CONSOLE - MODEL M-2 ORGAN

(with dust cover removed)
FIGURE 3

29

PEDAL DRAWBAR UPPER MAKUAL

DRAWBARS

LOWER MANUAL
DRAWBARS

CONTROL
TABLETS

PERCUSSION
CONTROL
TABLETS

LOWER OR
GREAT MANUAL

UPPER OR
SOLO MANUAL

PEDAL

SUSTAINING

CONTROL

FIGURE 1 FRONT VIEW OF CONSOLE hA'3

FIGURE 4

"START" AND

RLJN" SWITCHES
(UNDER MANUAJ-)

DIMENSIONS^
AC INPUT:
OUTPUT:
VEIGHT:

45-5/8" WIDE? 25-3/8"DEEP; 42" HIGH

103 WATTS

11 WATTS E.I. A.

249 LBS.

30

VIBRATO LINE
BOX

SCANNER

RUN MOTOh

```
POWER

Terminal

PANEL



AMPLlFfER



PHOr^OGRAPM
INPUT



PEDAL GUT OFF
CONTROL



SWELL CONTROL



PERCUSSION CUT OFF
CONTROL



BACK VIEW OF CONSOLE M-^
(WITH DUST COVER REMOVED)



MATCHfNG
TRANSFORWEft




KEt BUS 3 AH
SHIFTERS



STARTING
MOTOR



GENERATOR



PEDAL SWfTCh
ENCLOSED)



FIGURE 5
```

PEDAL DRAWBAR

LOWER MANUAL
DRAWBARS

CONTROL
TABLETS

START & RUN
SWITCHES

PILOT LIGHT

PEDAL

KEYBOARD

EXPRESSION
(VOLUME) PEDAL

UPPER OR
SOLO MANUAL

LOWER OR
GREAT MANUAL

TYPICAL M-lOO SERIES INSTRUMENT

DIMENSIONS:
AC INPUT:
OUTPUT:
WEIGHT:

44-3/4" WIDE; 25-1/2" DEEP; 44-1/2" HIGH

155 WATTS

22 WATTS E. I. A.

2 68 LBS.

FIGURE 6

32

TAB SWITCH ASSEMBLY

SCANNER

RUN MOTOR

SUSPENSION
SPRING

POWER
TERMINAL

PANEL
AMPLIFIER

PHONO
INPUT

PEDAL

CUTOFF

CONTROL

VIBRATO LINE BOX

PEDAL CONTROL

MATCHING TRANSFORMER

START
MOTOR

GENERATOR

REVERBERATION
UNIT AND
AMPLIFIER

SWELL CONTROL

PERCUSSION

CUT OFF

CONTROL

M-lOO

BACK VIEW OF CONSOLE
GENERATOR DUST COVER REMOVED

FIGURE 7

33

UPPER
WAAJUAL

0FMWBAA5

SPGIIAL
IMPUT'

LOWER

```
P4ANUAL



ORAWVBAftS



MATCHING
TRA^4S-
FORMER



1



MANUAL
SECTION

OF
AMPLlFfER



VIBRATO
LINE



g

5

u

o



AMOUNT

OF
VIBAATO'
TABLET



VIBRATO
SCAhNCR



VlftRATO

CHORUS'
TABLET
```

VIBRATO
TABLET

PEOALS

PEDAL SECTCN
OF
AMPLIFIER

PEDAL

cutoff'

PEOAL
ORAWBAR

INTER-
MEDIATE

SECTION OF

AMPLriEfl

EXPRES50N
CONTROL

I

RADIO-

PHONO

.*>■

ourmrr

SEC TON

OF

AMPLIFIER

SPEAKER

PEDAL
ATTACK
TABLET

PEDAJ.

decay'

TABLET

PEOAL
SUSTAIN IMC
CONTROL

VOLUME
TABLET

FIGURE 8

BLOCK DIAGRAM - MODEL M ORGAN

UPPER
WANUAL

DRAWBARS

UPPER

MATCHING
TRANS-
FORMER

LOWER

```
MAP4LIAL



DPAVvBHftHS



LOWER
MATCHING

TRAhiS-
FORMER



VIBRATO
SOLO
MANUAL"
TABLET



VIBRATO
LOWER
manual'

TABLET




VtBRATO'

CHANNEL




INTER-
MEDIATE

section of

amplif;€R



viflRATO

CHANNEL



VIBRATO

LINE



X
```

VIBRATO

cHonus"

TABLET

RADIO
PKONO'

I

EKPRE^^iO*^
CONTROL

T

OUTPUT
SECTION Of

AMPLIFIER

SPEAKER

AMOUNT OF

VlSRATO"

TABLET

VIBRATO
SCANNER

PEDALS

PEDAL SECTION
OF
AMPLIFIER

_^^

J

^

-^^^

-mT- "

^^^

'pedal

CUTOFF"

ASiJUSTMENT

'pedal

' ATTACK"
TABLET

1

"PEpAi^
DECAY -
TABLET

PEOAL

Sustaining

CONTROL

PEDAL
DRA*¥6Aq

^OluwC
TABLET

FIGURE 9 -BLOCK Diagram - MODEL M-2

34

O

3

U <

O

```
PEPC'J55rOt4
OM-OF F
TABLET



DRAWBARS



:>Cl ECTOR
TABLET



UPPER"

wA-CwiNG

THflNS-

FOavER



MATCMfMG

T H AM 5 -
FORMED



pf:oal

CUTOFF'
ADJU5Tl,»ENT



I

1



PERCU^S'ON

= ECTIONt OF
AMPLIFIER
```

```
-—{ DECAV TflOtET



^OHJME TABLET



«ADlO
PMQNO'



VIBRATO

50L0

man.^al'

TABLET



MO
ViBPATO'
CHANNEL



VIBHATO
LOAER

U A^JUAl'
TASLET




MtDJATE

SECTJON O*

AMPLif JER



I



EXPRE^^IQPJ
CONTROL



Output
section of

awpuifier
```

SPEAKER

vlSF^ATG
CHANNEL

n

VhSRATO
LINE

AMOUNT OF

VI an AT 0"

TABLET

vipflATO
5CANNEH

VIBRATO

CHORDS"
TA&LET

PEDAL SECTION
OF
AHPHFIER

I

PEOA?^
AT tack"

TABLET

PECAU
DRAi^flAP

' P£ DAL

```
DECAT ■

TABLET



PEDAL

SUSTAINING
CONTROL



vQlumc

TABLET



FIGURE 10 BLOCK DIAGRAM MODEL M-3



i



3






ViM/^n^






Tft&t






LOWfTt



EVUv*ftA8^ -Afl



H



^VStT TAW
```

```
* FLUTES '


^CAL^

TAU


Vast Of cavVaa

JPEttCy5^k»4 ^OTT TA4



]—

C^A^^AAS

4H*ft-*^


UPTCfl

*^ANLi4t.

_^__

^ V^e^UTO

MA~Cl-tlt4^


CANCEl-^
```

```
THAriS^DP**.^



TAB



y~i


MAfm^^^s


L-PWER

PH*AN^.hAl_

MArCk^P^4


ViVAT-D
C-A^*CEi_"
TAA


AMPLIFIED


u


Sf i^TiOM or


CELTSTEI
"C-ELELSTLIT


* ViB^AtO
TA»


I


VlflJ^AlQ ' Nt
```

```
^&AL

I

iTfAirf&ArE
AW^iFJER

1

"TFTt-iSiON

COJl-ftOL

Of
AM^hF^ H.

SPEiUUU

Ifyt*

biPAroJ

1-ftlT-

¥ -f *HlflArcH

^^*^ff"tfl

v^MATG ^A1An-l

TAB
```

l-^

HEtf V^IQh

S^A«A

' FAST
TAm

TAA

iff T '
TJ»

BLOCK DIAGRAM MODEL M-lOO

FIGURE 11

35

MAGNET

ONE Slot Of COIL CBOUNOED

COIL OUTPUT TERMINAL

TOME WHEEL

COIL

FIGURE 12 -TYPICAL TONE GENERATOR

@ @ @ @

18

\
\

\
\

e \@ \0 \@

\

\

(24)

\

\

'

```
so;



\



^ (5^\ ^^



® ® ®



SYh*CHftOkOOS
MOTOR CMD



57






(60) \ ^ \ (SB) ^



®^@ ® ®



'Q \



\




\



(7^

\
\
```

e

13) «

(56

D ® ©

e

BACK or GENERATOR
(AT BACK OF COMSOCE)

STARTING
MOTOR EM)

*NOT PRESENT ON Mi M-2t M-3

STARTING

MOTOR END

@

FRONT OF GENERATOR

SYNCHRONOUS
MOTOR END

@ Q @

e

36}

\

©\ @\ @\

(65)
\

\ @\ @\ ®\ ©\

S^ (31

40

A^

^

DOTTED LINES SHOW FREQUENCIES WHOSE TOME WHEELS ARE ON SAME ShiAfT

FIGURE 13 - MAGNET LOCATIONS - ON TONE GENERATOR

36

riLTni TnjLMVDfitocni

ri''Ci> C04KP4CM

iTUITiHC

95 We 6 ■■^

7|\47\64Vs8';69\*5\02\fl6' S7\9l\72\4e\«5\a9\^^

42"^««

^SVUo-*^ «-* "ii'>^>^ «2^««3-^' ^'3fl'^4V^ ^^ «^V°3V*>i^^'V2"3/'* *^'

,^76 ^ 54^-363 ;; 59^y 6 ; 52 2^, 6. ^^ 572V* ^ 50 ;^^79 - "^^^^2^29^^ 5 ^22^ io^^V^ I ^' 20**^fl
^SV^ I ""^

NUMBERS ON FILTER TRANSFORMERS ARE FREQUENCY NUMBERS OF TRANSFORMERS
NUMBERS BELOW TRANSFORMERS ARE OUTPUT TERMINAL FREQUENCY NUMBERS

FIGURE 14- GENERATOR COVER - MOOEL M ORGAN

MOTOA (t«

FILTER TnAl4V0RMCII»

fl42-| Ul

STARTTHC
UDTOfl END

j T^e

^£3'*^ n ^ !gB^4

NUMBERS ON FILTER TRANSFORMERS ARE FREQUENCY NUMBERS OF TRANSFORMERS
NUMBERS ABOVE AND BELOW TRANSFORMERS ARE OUTPUT TERMINAL FREQUENCY NUMBERS

FIGURE GA- GENERATOR COVER- MODEL M ORGAN

HR'AL f*\jVlALn raOftS *PVC -JP

FIGURE 14A

37

o

o

O O

o o

m m

r r

5 >

```
> f"

'' Z

z c




m

Tl

o

> > rn

> S '

rp » — —
O o 3

m






z

z

c

c

I 5

(B

01

m

m
```

```
s

:□

w

in

>

O

m

z

o
<

■^

m

f-



-1

>

tn

2

9

Q



0)
```

```
m


r

>

o

z

£


H

o

B

33

>

£

z

m

L/s

71

"n

t/p



>
```

```
m


J3

Tl

u>

n


m

>

O

:d

c

m

m

O
-*

z
n
-<

TJ

z

C
```

```
c

H

£

m

m

S.

lA

Z
>

O

r

-<


n

Tl

>

31

z


l/t

O

Tl
```

```
c

o

m

13

z

z

n

m

-<

n

z

U1

c


£


en


m


13
```

U1

38

I/)
It

2 .

<^^

^ z

cc =

UJ 3

oD a:

5 UJ

```
^ t-



z



H



il






U o



U


O UJ
UJ cc


a:

UJ


>

o


a: <


>
```

```
<

u.

o

o«

5^

o

cr
o

5

to

s

S2

0^

6

33


z

§5

UJ

z

X

o


UJ
```

```
O

Q

S3

1

<

H UJ

^



H

'^



Ld

i

LJ UJ

q:

_f

i^ S



UJ

zS
o <
```

```
CD
Li-


Q
O

2


1/) tn







o: a:






UJ UJ






en CO






5 5






D D








39



en
m

-4
```

```
O
P7
2

W

>

o

O

o


CO

W

B

CO


c c



S i



[p CP



m n



:d X



L/l [/*



> O
```

```
S^

< Z7

n r

H

*• R

or^

n -4

r IP

O >

5^



73 O

> X
```

```
^

o ^

1

i>"^


ss

o

tfl

GJ

-n


> 3)


^ nr


n o


oS


15


H
```

```
Z

H C

n E

:J3 CD

z ^

— u

Z t/)

^s

^J

o >

c ?

n tfl

FORM
```

```
NCY



z n



C 33



i t/J



0)



n



33



cy)






.- t/*


8


O Z



H O



O X
```

75 XI

O

^ Z

z o

Q C

^^^

40

i

♦CONTACTS GROUNDED THROUGH 16 OHMS
IN MODEL M-3 AND M-IOO. NO CONNECT- MANUAL WIRING CHART

ION IN MODEL M AND M-2

FIGURE IB

1

■

!ii

;

z
>
z

UJ

a:

u.

c

S

*

```
1

1

m

UJ

o

z






o


2
Z '

>-

1




z

UJ






o








Oi








*
```

3

r—

s

»

•
<

4>
■1

s

O

01

#

*1

9
ID

*— — -

■ o

«

■1

«

•

o

1

<

1

1

3

«k

Z
ft*

X

X
«-l

I
1-

```
X






X

ru




tt 1
^ 1




1^






*


c
^




o 1










□h




*




*1
```

```
* ;

P

•1

O

9

*

Ik

*
¥)

•n ,

Pi

</)

1

•n
O

J.

■3

S

-»
```

```
u




IT
O

1


Z
1


UJ


ul
O

z

<

ct

o


_J

Ul


z

UJ
UJ

O


_J


t-

ul

>


>-


Ul

i
```

```
o

S

»

o

2

ni

V
s

*

o

#

»
^
```

s

<■

4^

3 S

9

*

O

9

V .

«1

J_

i£

```
_ J

43

J



s


*


01

*
<




s


o

r^



S


a





a



1
```

```
1

1

Ul

z

G

u



r^



rt P-


o

a













• -

1 1


s


O


o
^



*


<
```

```
O


IS s

a









a

n


«



i

*1

ID






s
```

^^ — .

Si

J

<n 1

s

^
«

C

4

S

o

s

s

3

h-
O

```
41

1

ID '

s

1^

«3

m
u.

Ik

If

1

1

r^ 1

;

O

a

L .

in
```

a

^^

c 1

s

1

a

^

2

ni

r^

<l

'

o

```
u


1

«


OJ

r-
1

, J










i3

in


b J

o


«

ID
O


O




O

CI


li
o

o


8
```

«n

V 1

^

r^

1M

pH

a

in

m
u

u

fM

O 1

s

«

```
pi.



s

s




m

_2_

c

c


s

P^

s

*1


9 1

1



K


n
A

Sj


s
```

```
f^ i




^
«


tfl


CJ
OJ

O


2
3

1

h- ■

Oi
<1


c

•




OJ

o


1

m

1

1

ru

; *^

S

o
```

```
a -f
p*


s


«




5




' i

« ;






o


1 J

n




«
nj


■

4
1

<


■ H^






o
```

```
! r- 1 O

1 a




8 2



n
-^











1 '^ 1

•

1

' f*J


1

\-

' %

1

1 ^



3
```

s

o

Ai

tfi

^

*

*1

y

2

o

k 1

o

1 r-

■ o ,

```
s

u,

u.

1

UJ

#
o

o

«
u

r ■

u

<

<




m




rt

«



r

o

1

o

? ?



S


9
^
```

```
o

1*)

1 c

k

1

o

en


o

9

«



1






rg
o

1

k .

fc ^

Si

^ — 1

a
```

```
3

r*

1 r^

^ H




9

o

in

1


s

nj

> .


o



o
```

```
ni




4^


s


s





€>

ni


s




—

r^ 1 A






*


r-
(O


Ok




«
```

```
2


h _

f^

<

(0

' 3

L H

L

o


1 ■

p 1

o

01

«>
rt

^

rt



^1

1 o
```

```
S'

a


r4

tH
*
^

1 r-


o
Ol

'5

'5


s

h-


rO
```

```
nj

<*>
o


OJ


•1


5

►

1 t^

1


Ol


1






2


o

p^

r

a

1

€>
1

1 «


p

1 ^

O

1^




P- 1
```

```
1

s

r^

o

fl

^

V

^
tt

o

o

CO

c^J

^

^

■^

V

o

o
```

```
m

1

c

$

(*1



a
o

s

It

o



8

"0

in

1»

fid



1L

o

1 «
```

```
\

h

1 rf^


a

L

s


OJ









U-


«




UJ

Z
O


z




UJ

If


o

>
1


2
UJ
UJ

O


u>
```

```
UJ

_J

g
>



UJ

1-

X


u;

*
o


•^


Od

«

r-

rg


1 .

o

1

o

1

?!


h ■

1



(0 t-


3
```

```
^
O


a


1

s


1







OJ


'

O

i J


a ^
^]

S 2

O




1 J


O

O i
O 1




m
u


5




u.
```

o

2

i4^

r ■

o

m

X

»-

X

1-

'

C

■1 1

1

«

<

CM
CI

**>

rg

```
■ ^

3

a

^
->

s







o

*
o

a

¥3

1*1


si


<

O

— ^ "f

o

m

A
```

```
EM

1

o

o
^

rij
o
Ol

Ol

r

' a
*

(M

L
```

z

V

tfl

in

1 - —

g

Ik

p^

s

r—

L ■ J

2

P" — ■ — ■

s

kk

«

01

; 2|

8

«

41

LOWER MANUAL -

r

UPPER MANUAL

DRAWBAR ASSEMBLY
FIGURE 19

PEDAL

CONTACT
SPRINGS

PEDAL
CABLE

NOTE OF

SCALE

KEYING

CONTACT

FOR ALL
PEDALS

PEDAL

TENSION
SPRINGS

GENERATOR
FREQUENCY

NUMBER

PEDAL KEYBOARD - MODEL M. M-2t AND M-3

FIGURE 20

PEDAL

CONTACT

SPRINGS

PEDAL
CABLE

NOTE OF
SCALE

8

8 9 10 n 12

KEYING CONTACT
FOR ALL
PEDALS

PEDAL

TENStON

SPRINGS

13

GENERATOR
FREQUENCY
NUMBER

FIGURE 21 , PEDAL KEY BOARD MODEL M-lOO

IWUT FAOM
ej5 TUBE

veAATO

CMOflUS'

TABLET

VIBRATO
TABLET

AMOUNT OF VIBRATO TABLET

H

OUTPUT

TO aJT
TUBE

SECTIONS or VtBRATO LIME

FIGURE 22 'FUNDAMENTAL OiAGRAW OF VIBRATO

SYSTEM IN MODEL M ORGAN

43

OUTPUT OF

h^^Rh#^AL

viaPATO

SYSTEM

A TO lin£ boh.

^

20 L2I Tl22Xi5 ^^*

VTT"^Ol

U1

O
O

.000^7

D

w

"I

O
O

- o .

_ o
■o

VIBRATO PHASE SHIFT L^NE -

RI4

"vibrato
chorus"

RI5

I2>^EJS
Vl&RATO
"OFF-

X

VIBRATO-

FIGURE 23 -VIBRATO SYSTEM

MODEL M CONSOLES BEH^W StRlftL NtjM&ER li509

r40RM4L

INPLJT OF
VlRRATO
5V&TEM

NORMAL VibRATO
VI&RATO" 'ON"

FIGURE 24-V^BRATO SYSTEM

MODtL >A CQKjSOLES SERIAL NUMBER ii509 f^MD AftO^E

44

AMOUNT OF VIBRATO TABLET

INPUT FROM

MANUAL
AMPLIFIER

VIBRATO

CHOftUS"

TABLET

SECTIONS OF VIBRATO LINE

OUTPUT TO

INTERMEDIATE
AMPLIFIER

FIGURE 25 -FUNDAMENTAL DIAGRAM OF VIBRATO

SYSTEM IN MODEL M-2 AND M-3

INPUT FROM

MANUAL
AMPLIFIER

VIBRATO
CHORUS'
TAB

AMOUWT OF VIBRATO TABLET
I

SECTIONS OF VIBRATO LINE

OUTPUT TO

INTERMEDIATE
AMPLIFIER

CELESTE I
fcELESTE H

TABS

MODEL M-lOO FUNDAMENTAL DIAGRAM OF VIBRATO SYSTEM

FIGURE 26

m Lio

L2 LI

LI3 UA

LI6 LI7

U20 Lai

FIGURE 27 -VIBRATO LINE BOX-MODEL M AND M-2 ORGAN

46

L-1

Mf Gt

Later models use a somewhat smaller box, with metal framework. T"™'""' '

FIGURE 28 VIBRATO LINE BOX MODEL M-3

FIGURE 29 VIBRATO LINE BOX ^^^^^ ^-100

SIDE BRUSH
TENSION SPRING ^

ROTOR CONTACT PiN

ROTOR 'NSULATOR

END BRUSH MOUNTED
ON LEAF SPRING

-2 SIDE BRUSHES

ROTOR PLATES

STATIONARY PLATES

A-BRUSH COVER REMOVED TO SHOW BRUSHES

B-VlEW WITH SCANNER COVER REMOVED
(2 SETS OF PLATES REMOVED TO SHOW ROTOR

FIGURE 30 vjgRATO SCANNER

```
INPUT O*
VlflHATQ



OUTPUT O*
ST STEM




vkaoATo t .ne box



^5000 fl^a



VIBRATO Ph>5E SHIFT LINE



J



'¥lBft*TO I =






(rfODE



L W'



VIBRATO SYSTEM

1 CONSOLES Stfli*L NijWBEfl iMOO TO 2S25i)

FIGURE 31



hWP JT OF
VIMATO
SrSTtM



OLfTFHjT OF

VIBRATO
```

STSTEM

*TD LINE BtMt

NOflMAL
Vlftft*TO'

VIBRATO SYSTEM

UOOEL M-Z CON&OLCa SERIAU fiuhiDta 2S2S4 AND ABOVE

FIGURE 32

THIS VIBRATO LINE BOX
HAS DIFFERENT APPEAR-
ANCE THAN UNIT IN
FIGURE 31

48

LOWER MANUAL SCREWS

END BLOCK SCREWS

CONSOLE
LEG

(S

— i

LOWER MANUAL TERMINAL STRJR COVER

UPPER MANUAL MOUNTING BOLTS

HOLE fOft
ACCESS TO
SCREW

SCREWS HOLDING MANUALS
(VIEW LOOKING UP UNDER KEYBOARD)

FIGURE 33

NOTES

49

50

^Ti^V

o-

■J

o

i

Jl

```
■^ovraTT



u






N33tio ei



*W)-T-13A'a3tf CJ.



imgici



A3U?



ti



o



3

p rt
Ij- t—

z
<
ir



O

a

3

o



in
```

```
a

9

<






N35a:j



11 A



<

o



LU

Q
O

r

U-

-J

<

O

L1J

Q



u

z
o

O



1/1

z
o
```

```
z
z
o
o

s

z
g



LLi J,



I

m

UJ

cr

CD



in



m O
Z Q

UJ ^



51



CI

m

UJ







?2

So

u. <
```

```
m — ^

? m

c
IP



O
O
O

>

z

>

o

<



o



^>



V



m
I



■n

:s

U> Ji

>

m

^ '^

Ji
```

```
<

O ^

— 1

m

n

T

X

m

in



Tl


y*

ID

5

T >

o

r"

r» z
```

```
o

a o

L

11

> o


T?

:u o

>

r^ z

01

z

^i

tfl

r

H


w

^


ja

(n
```

```
i/>




—J


u


5

X

m


z fJ

_i ;n O

r "'I s

^ r\ *

I*
S


T4 SLACH



T4 GREY


T4 euoE


O


n
```

T4 RED-YELLOW

<J

52

NOTE:

A change in all amplifiers coded "H" and above removes che positive voltage from che stacors

of rhe swell assembly. This can be incorporated in earlier amplifiers by following the steps below. The end result will place a blocking condenser (.02 mfd, 600v) between pin 1 of the 12AX7 and the swell stacors. This change will insure continued noise free operation of earlier amplifiers.

Step tfl
Step Ul
Step *3
Step UA

Move lower lead of C17 from lug B to lug A. Remove jumper.
Move lower leads of R33, R35» C16 and Green lead from lug C co lug B
Move lower lead of R32, C15 and Blue lead (C15) from lug D co lug C.
Add C9 from lug C to D,

r

=^s^

:_i "

^

^^^^-^

^

s

PICTORIAL M-3 AMP (PARTIAL)

r

FIGURE 36A

53

54

CO

W

W
en

o
o

I

a;

-I
n, to

O
m

o

o

O m
U

```
o

I/)


m

Ui


I


55


i





0*


P


c



/-- T* ^

I

"^ (f t^


-*
```

```
cs

1
1 =
y
\ ^

"■
/
\ ^

s rfc
r
X
1
/
g^ s\
1 V *
^ >■
1^
=? J
1
```

```
is

\

x:i

1

tRf

■ -(-

1

^£

^t

L

■


1


-n

c=


O


>


I

o
o
```

```
n

>
o

^ <:

CD

SI
>

o

>



?3



J




1






o






-• N -h


^1-




02 !i






[S3 ^-


-T 1
```

```
=^i^


1



»v


1 1


3


o >

w 3

r" *





n

>

c


?;



o
o
o
```

```
56



ti] u w w w w tj

>>>>>>>

o o ooooo

CQ CQ CQ CQ CQ CQ CQ
Q Q Q Q Q Q Q

u^ f\j r- o -^ -^ iTf

o X CO CO Lr» ^ in

O ^ ro in fo in f\j

^ CO ^ -^ no ^ ro

O '^ vD vO ^ iTi tn

^^ fvj rn -H CO f\] ld
O O O ^ ^ vD ^



*i

J _ -»


=1


so


ir


-i-"-^




rTT


1 v^

r-l-SsJ-,




QP=
```

```
<

-J

o O

3

-

^

i

1

,

CD
DC

ESI

— ] r^

\-'^>^

*
```

```
o

4

V]

<

-d
V

a

_ *

pi-i

4)

c

u

c:

•iH

rt
```

```
-

T)

a c

£

w


o

en

1.1

o;

o
u



T3

o

OJ

^^r

rD

^«-l

■ w

u

0)


-—4
```

```
tu

>S

cxj::

4/

-— *

-^

4-h

H

O

n3

&

■*i-




w

1—1

o
o

9


<

z
```

```
o

H

<

a:
W

CQ

a;
w
>

o

u

I— I

<

en



CO
rn

ill
cr

CD



-A



57



m

UJ



O

>
o

o

o
<
```

```
>




»--
o
o

w

en



c/>



f¥ \^ rv

■ *

rs ra ^

B ^ g

& rn m
o



m



o



■5 s -^

cz o ^

m — 4 n



?^ 3 C3P

5



— ? trt



5
```

O

2

i3T^

? £?l

p e

i'

si

4

I
<1>

on

:0

=s

■AAA/^

n

r

P or
i

r

FN)

cr

TTTTTaTB

-■I

ih

2

/\

58

MANUAL AMPLIFIER

INTERMEDIATE AMPLIFIER

```
OUTPU

AMPLIFIER

UPPER MA.^^JAL
DRAW9ARS

NINE
BUSBARS IN
' 0RAW3AR

LOWER MANUAL
DRAWBAR 5

MATCHING
TRANSFORMER

T1

MATCH
TRAN'

--vv.v

22 MEG

R4

1

I KEY CONTACT
■ RESISTANCE

WIRES ALL

I J6 OHMS
```

at

<h

r"

5^--

LU

EACH DRAWBAR
HAS 2 BRUSHES

CONNECTED BY
ONE OHW RESJSTOR

W J— ^^d7nQO

6. a MEG C6 .000015

}*-

-±

<

^<

SET OF NINE CONTACTS Ur^DER
TYPICAL PLAYING KEY ON
UPPER MANUAL

```
i>^A*jv-o — V

c-AVAr<i — V



LOWER MANUAL
BUSBARS






TAPPED 1/2 OHM RESISTOR
PROVIDES ^NTEN3tTY
STEPS FOR DRAWBARS




.005



^l



S Rd

,4-VW.— H
P5\2.£MEG



SPEC
INPUT'






lOV.




^SCANNER^




?




C35
```

```
EXPRESSION
CONTROL

_Y LOUD


C44


300V.


.000015


4__^^


5CAN
PEO"


d:


u


NEGATIVE FEEDBACJ^
CIRCUIT PROVIDES VOLUME
COMPENSATION FOR
'VIBRATO OFF"


yiBRATO LiNE BOX^
TERMINALS


AMOUNT OF V
NORMAL J--/--/--/-"


R27 R29

I SMEG;LdMEO
```

CIS C40

SMALL

.25

,0002 .0002

V4
feSC7

?j:i^

R25

J|_l — VA*

C36 1-5 MEG

25V &

r ^

V

■n

^ ^

*?*oi

```
-la

^^ a

+ 290

A RADIO' PHONO

,05

300V

+ 265

k

+ ?2

VIBRATO ■ "^NORMAL t:^o

OUTPUT
TRANSFORMER

00

X

CHORUS
```

OFF

VlfiRATO'ttiS

ON

3

L2 L3

SET OF NfNE CONTACTS UNDER
TYPICAL PLAYfNG KEY ON
LOWER MANUAL

L4

l6

T2

C46 •**

-000024-000090

->J^

-s

SPEAKER
VOICE COIL
S OHMS

U'>i|J

N

5 ^

i-O

VT^TvlT

"■ I r-l' J _L J_

IT

J I LEO LHI |L22 IL23

C34

00067

_i3

VIBRATO -=^

TYPICA

NORMAL

—3.

x

VIBRATO PHASE SHIFT LINE

(FOR E3CACT CIRCUIT SEE FIGURES !2A AND T2B-1

GENERATOR OUTPUT
TERMINALS

PEDAL AMPLIFIER

PEDAL IN C49

2aov. WITH NO PEDAL PRESSED
120V WITH ANY PEDA^ PRESSED

PED

.02

V7
€BA6

4,5 V A.C.

■ SOFT

RS7
— ^^VVX —

"VOLUME'

C53

22 MEG

.005 ^^

-J

X

POWER SUPPLY

1.5V. WITH^
ANY PEDAL
PRESSED

50 V WITH NO PEPAL PRESSED

40 V. WITH ANY PEDAL PRESSED

+2 90

RUN SWITCH
■OFF-

```
POWER
TRANSFORMER

6.3 V.



C55






.IB MEG



BLK



120 V



"PEDAL CUTOFF



R53



R54



KEY SW M



7^'^



ATT- KEY



3.9 MEG
DECAY SW(

NORMAkl



22M£G
"SUS SW' '^
```

```
-O-20


-START" 250
BUTTON


STARTING
MOTOR


SYNCHRO-
NOUS
MOTOR


110 V


>!


1


.01 ^


HEATERS


5V


C57


-115


in
```

```
R6



rtot I r^o




+ 300 +290 *2e5
9 9 9



R67 ' R&e '



560 iflOO



« J-« "_L tf



^J



GREY



56000 2200 i2Q00

'SPEAKER FIELD"
_, r^TT'



pj



FIELD 1000 OHMS



FAST

■PEEWL
DECAY



ON
```

PEDAL
SUSTAINING
CONTROL

PEDAL
ATTACK

PEDAL KEYING

E F F' G
PEDAL CONTACTS

CONTACT CLOSES
AFTER ANY PEDAL
CONTACT OPENS

ALL VOLTAGES ARE PLUS FROM OROUNC UNLESS OTHERWISE NOTED-
ALL DX, VOLTAGES MEASURED WITH 20,000 OMMS-PER-VOLT METER-
• * • THIS IS A FIXED CAPACITOR [0OO06 MFD.J IN CONSOLES BELOW SERIAL
NUMBER 6411.
* » THIS JUMPER AND RESISTOR IN CONSOLES BELOW SERIAL NUMBER 3 41? ONLY,

• THIS RESISTOR IN CONSOLES SERIAL NUM3ER 9411 AND ABOVE-

AO-21007-0

SCHEMATIC DIAGRAM - MODEL M ORGAN

SCHEMATIC DIAGRAM
MODEL M
FIGURE 40

59

VIBRATO LINE BOX

TO CONTROL PANEL TO SCANNER

rr^ -z % z2:cijc^« %^ X 3 '^~n ^TO amplifier

IIOO^OCCf.CCOCODOo'-'

DRAWBARS

-i A-

CO ^

BK

Bh

D D C

MATCHING
TRANSFORMER

PEDAL
DRAWBAR

V

i

```
H^



G a



75 74



52 51



29 ze



rs



Upr^ER
MANUAL



<U



^ FROM MANUAL
BUSBARS



FREOUF^*CY
NUMBERS -
```

V

6

11^'_

6 6
75 74

6 o 6

6 6

,11

cooooc Qcoboo DQor

HI

29

c 6

i

l_OWER
MANUAL

/- Rt r^

TO AMPLIFIER

CONTROL PANEL

\

eCN WPRES TO
CONTROL PANEL

VIBRATO

JUMPER WIRES
\ CONNECT SCANNER
TERMINALS OF
^\ SAME NUMBERS

2 P*- ^ BOTTO M

. /
/

-^3 WIRES TO
BN BK ^' VIBRATO LINE BOX

SCANNER

GENERATOR

B5 c 669 WJo 7i o 47 640 SBc 69£^ 15o 62g BOc £7c Sf p 72o 4&v 65

AZ9

309

3S9

339 3&9

o 43; 3Ji;.

BOO 41

L. ^^A

TO MATCH. TRANS
TO AMPLIFIER

■TO VIBRATO LINE •\

GY

.GN

VIBRATO LINE BOX
NUMBERS

6 '

fB^

BK

J=dt..

t*.Uo

CT'jiX'^^^ygj:?,'

^

TO GENERATOR

lA'

TO CONTROL
PANEL

4 BN WIRES TO
VIBRATO LJNE

e BK Wtf*ES TO
VIBRATO LfNt

C CN WIRES TO
SCANNER

•T " -7

```
la



76 54 ^83 59 ^ 76 52 1 ftf 57 . ■*! 30 79 55 ^

6^ 23 M^ 28 4T 21 9] 26 2, IQ 7^^ 24 12^ 20 sT



77 _53




89o 70c 46

S4c i39




TO CONTROL PANEL
R42



o87 06B d44 cCl



/f^



^tr?



I I



BK



J-^



^



o
```

c49^

FREQUENCY NUMBERS

25 t^ 11

jv-'Vif'vwjrjj^

'RUN-
SWITCH

'START-
BUTTON

FROM

CONTROL PANEL

^d—b^^ r-

1

I 1 '

AN

" £J

YEL

FROM

```
CONTROL PANEL

AC LINE 120V MOV SPKR
GREY BLK BRWN FIELD

WH BK

GY , BK ISN

BK

BK iBN BL

i5

1

LINE
PANEL

YEL

GY

R IBK

BK
```

DECAY SUS PEDAL
SW SW IN

GW ^' BK GY

AMPLIFIER

FROM CONTROL PANEL
[^PEDAL DRAWBARJ

FROM

/ SPEAKER N,

/ MATCH TRANS

MATCH

```
TRAN


GY
© ® ©
IGN BK


y


COLOR CODE

BK

BLACK

BN

BROWN

R

RED

OR

ORANGE

YEL

YELLOW

GN

GREEN

BL

BLUE

```

```
VIO

VIOLET

GY

GREY

WH

WHITE

s

TO SUSTi^lNINC SWITCH

ON EXPRESSION PEDAI

LINE
CORD

STARTING
MOTOR

SrNC.
MOTOR

7

BN |BKGVlBK^BK^feK^BK^BK^BK_lB.
rREQ.NdS.l2

7

r
```

NOTES B

II 10 9 B

A* A G= G

i 4 3 z \ -i-

PEDAL KEYBOARD

WIRING DIAGRAM
MODEL M
FIGURE 41

WIRING DIAGRAM- MODEL M ORGAN

60

VIBRATO LINE BOX

TO CONTROL Panel
^ . ^

TO SCANNER

P-T -^^--»-"»^w_^^

[T'Z Z<:22:tx<:c^ ^"V »; ^fafT") ,T0 AMPLIFIER

DRAWBARS

V

rr'^TT'^ — r.

rni

~^

7" 74

13 5'

29 29

16

UPPER
MANUAL

OJ

HK

MATCHING
TRANSFORMER

^Trj 1^

PEDAL
DRAWBAR

O

FROM MANUAL
BUSBARS

\

FREQUENCY
hJUMBERS –

'. ■ >/'.' 1^

```
6 ii> 6 6 a 6



' — 7^"'"


Tl'


OS 000 Q

75 74



"7 ^ T-


□ c


660


"T y



U

□ 60 00 t b f>



u


3060
```

```
29 2&





\A



LOWER
MANUAL



e CN WfPES TO
CONTROL PANEL



■o ^ ? % \ CONNECT SCANNER'

TERMINALS OF
SAME NUMBERS




BOTTOM



BN BK " VIBRATO LINE BOX
VIBRATO i SCANNER



GENERATOR



42? 309 :> 359 **Oo c a 339 3a';* o 43? 31



90T 71




^



11'^



CI 3 6c 4 1 o
```

-tr.

47? 64^ ae- eg? ^45? 02? ae^ e/" 8i^ 72; ^af 'es'^

LLXJii! i ii n i till

TO AMPLIFIER— ^^*4

CONTROL PANEL

TO MATCH. TRANS

-TOAMPLJF"IER

^

GY

6K

BN

\^h

EEC^CSS^ ^ ^^ctctt:^:':':^^'^':'^^^'^^?^

GENERATOR

R42-

63 59 . 76 52

W 50^79 5534 BO,77_53

70

-i^TO CONTROL PANEL

-TO CONTROL
PANEL

4BN WfFES TO
VIBRATO LINE

fl BK WIRES TO

VIBRATO LINE

6GN WIRES TO

SCANNER

„^^ 34p 390 0'

a o ' 3 ^

~ 4fl^ fl3 S7 eSi |44

SI

BK

6

T

.32 53 ^75 5i .30 50 .73

13 i. ^*<EQUfcf^CT NUMBERS

tr.-^ tJjr.T ^J n P iif ^ f ■ T I TrTT--"=cxrj'!^?3&^':^^ ■ V ■RA^XJlTV.A^Tl

rt '-Ajj.AJT i

■run'
SWITCH

'START-
BUTTON

FROM

CONTROL PANEL

I 1

i r--, BN L >
l^3i 1?__!

YEL

FROM

FROM PEDAL

CONTROL PAN£;L

DRAWBAR

^

SPEAKER

FROM CONTROL PANEL

III3

AC LINE
GREY BLK

WH BK

I2CV nov

BRWN

5PKR
FIELD

BM

BKjBK ;B N[BL

YEL

LINE
PANEL

BKi m

BN BN

GY

V

\^

DECAY SUS
SW SW

BKl GN

GN Y BK

PEDAL

IN

VOICE
COIL

GY

PED KEY VI B

BNI 6K
fBN

```
SCAN
PED

BK WBK

6



(PEDAL DRAWBAR}

FROM
MATCH TRANS.



WATCH
TRAN



GN



AMPLIFIER



/



COLOR CODE


»,


SLACK


BN


BROWN


R


RED


OR


ORANGE
```

```
YEL

YELLOW

CN

GBEEN

w.

BLUE

VIO

VIOLET

OY

GREY

WH

WH'TE

TO SUSTAINING SWITCH

ON EXPRESSION PECAL

^

LiNE
CORO

STARTING
MOTOR

SYNC.
MOTOR
```

```
" f ((

3N BKGYmK

a id

FREQ, NO'SJZ
NOTES B



T



T



f



T^-^^-r-^^""



^WV^^'^



3K



PEDAL KEYBOARD



REVISED GENERATOR COVER
SERIAL NO, IS083 AND ABOVE



WIRING DIAGRAM -MODEL M ORGAN



WIRING DIAGRAM



MODEL M
FIGURE



- 15033 AND ABOVE
```

41?\

61

r

t 0*TCMlHG

„ Q?eBRE^59?

LOWER WAf^UAL

MANIUAL AMPLIFIER

GENERATORS

49-91 OSE
THtS DRCUlT

BagaR

(iENtaATORS
A4-4B VJSE
THIS CiPCUJT

t KtT CWJTaCT
I «E5i5T*NCt

I lb OKU2

I

•ri

itj

ff^

ipW

U^

Off

TZ 'vibrato

THA^SFOHMfP, MA**UAL

'vibrato !i:"H^

LOWER
uanual.'

■ON'

DR*WB*n
^ BRUSHES
ONNECTCD Bv

Ohm RESI5TOH

5tT or NihiE CONTACT! UNCER
TTPJ C*L Plating f^EY OH

IJPP£H U*NUAL

16-43 uit
THIS CIRCUIT

»/i

LOWER MANUAL BULBARS

INTERMEDIATE AMPLfFlER

RiV

.000025

O jO

SET Of NINE CONTACT! UNDER
rTf*iC*L Slaving utT ON

LOWER UAhUAL

^

NEH*TOW OUTrUT^
TERMINALS

PEDAL CABlE

'4-^.

I^mLG

r

m

VJB S^-^

R2 R2A

2tlV

^ i-4=

* «-. ^ELttTED M

•'^2*0 FACTORS TO
^\t eALA»dC(.

CHAhSELS

0.2 k4£& 2.7H£<i

VI c J

"^ t5J7|z5v I,

t T (T-^-^ti

47000

-OOI V3

1^

■*Z90

■*Z40

C20 IS OOOOiO IN SERifci-
MO ^b49& ANO AbOVt

EXPRE35*0N
CONTROLT

OUTPUT AMPLIFIER

(5tT AT *ACTO«>')

CiO

CIS

V4
6SC7

r^

.0DC2 - ^°'

R2«

«2»0 I'^uEgJ LAUEG >

\ SOFT

,0OOD24-,000C§O

*5

€5NT^^^^

C2S

tTh

ZU)

U

1-1*0

! K -f •

or s. * lu

■^ (V > --LI

viB fC).
LINE- Y^

VIBWA70 L^Ng BO*
TERMINALS

```
'vibrato ^JNOHMAl h^ < p
CMOnuS' \ VIBRATCT ' > o


ru




'AMOUNT OF VIBRATO'


^ SCANNER ^


>.


A



g>oy


o


B 4



+Z90



£60 V


-^SM,


\1MS1
```

\

^\

4

fO«^ EIACT vlMATO CtRCUlT
SEE rifcURE IS

VIBRATO PHASE SHIFT LINE

VOLUME

NO PEDAL PRESSED OV.
AMY PEDAL PRESSED (v

NO PEEAL PRESSED 260V
ANY PECAL PRESSED S5V

N«] PEDAL PRESSED 45V
AM" PEDAL PHESSeO 55V

^Z

PEDAL^^MPLlFiER / "^

-M 4s 4^

^

```
NORMAL
"SOFT'

Ai^L DC VOLTAGES MEASURED iVlTH
20000-OHMS-PER-VOlT METER

^ ££ MEIf

^05

RUM SWITCH

POWER
TRANSFORMER
T4

POWER SUPPLY

f>i o<

'-^EYSw- Pes

R74

ZiO

120 V

BLA

RB?

-START- ?5o
```

```
WJTTOH (looo FOR

a4Dv)



STARTING
MOTOR



110 V



STNCHBO-
tslOUS
MOTOR



fc.1V
HEATERS



tZVO -t-ZftO



^ «



ATT- KEY



. 4700





39 MEG

^DCCAT Sw'gj'suS Sw"



^ORual'



FAST




-Zi
```

GREY

HEATER RESISTOR

■'^AVv

(iBDDOFORiAO V)

EMRRtSSrON COhYWOl

- 3ii

E^8

"^S 3,. I 5

W

Ra««

RM

'OFF

ON

PEDAL
ATTACK'

od"e ff*gg*a*^b

```
pedal contacts



PEDAL HErlN&

CONTACT C^.OiES
AFTER ANY PEDAL
CONTACT OPENS



"PEDAL PEDAL

DELAY" Sustaining
CONTROL



T4



T3




0©00@0@0



^»ooo



-z\




SPEAKER f lELO

— ^fcrr^ —



TOP VltW OF AMPLIFIER



70O OHMSB

* \H EARLY M-; CONSOLES (seRlAL ntfS. &ELOW iljso)
RBS IS S4000. Ra7 (1 jOpOO. Af*D SPEAKER FIELD IS
lOo! OHMS.



SCHEMATIC DIAGRAM

MODEL M-2 ~ 19000 AND ABOVE
```

FIGURE 42

SCHEMATIC DAGRAM- MODEL M-2

SERIAL NUUBEn lUOO AND ABOVI

COUPLES VIBRATO line; SCRIAL WU»UR nz»4 ANDAbOvE

62

VIBRATO LINE BOX

TO COMTROl PAi^EL TO SCAHWE-R

TO GENERATOR

6 G^J WIHE5 TO
COhTPOL PANFL

STARTING
MOTOR

SYNC.
MOTOR

SERIAL NO .9000 AND ABOVE

WiRtNG DIAGRAM OF HAMMOND ORGAN CONSOLE MODEL M-2

WIRING DIAGRAM

MODEL H-2 - I90OO AND ABOVE

FIGURE 43

63

VIBRATO LINE BOX

TO CONTROL PANEL TO SCANNER

DRAWBARS

GV

GY

MATCHING TRANSFORMERS

T2(lDWER M^NiJAt.) Tl(SOLO manual)

TO QEHIHAJOR

6 GN WIRES TO

CONTROL PANEL

STARTING
MOTOR

5YNC.
MOTOR

WIRING DIAGRAM

MODEL M-2 - 25254 AND ABOVE

FIGURE 43A

WiRlMG DIAGRAM OF HAMMOND ORGAN CONSOLE MODEL M-2

I

COUPLED VIBRATO LINE SERIAI. 25254 AND ABOVE

64

/

i/i
<

o

<

IT

UJ

o

z
o

H

30LO

T

iMATCHING

ORAw6AaS

Fl R R R H MATCHi^JG

LJLJLJLJL^ TOAMSfORiv

```
GENERATORS
4^'^L 1J5E
THjS C<RCU(T

GENERATORS

Q

- VlB*UTO -^
SOLD

VIBRATO
LOW£P

majjllal"

^

R 30

-WW

,0000.^0
■C6

ft2< n22
10 MEG 5 3WF:G

KTOOc!

MANUAL
AMPLIFIER

INTERMEDIATE AMPLIFIER

CI3 iroooos
```

OUTPUT AMPLIFIER

■

i/

«^a

r^t^ CQUJACT

RESISTANCE

WIRES ALL
IS QMMS

<Xi

s

GENERATORS

;6-43 USE
TH15 CIRCUIT

VIBRATO
CHAf^MEL
INRJT

/

0000^7,

*l-5 6 .

^7ME&

```
£50

SELECTED AT

TACTORV TO

BALANCE

CHANNELS



cz



EXPRESSION
COMT^OL

/LOLjD



^



5ET At TACTCRV



C25A



CIS



CI6



VIBPaTO CHANNEL
INJPUT



te



H6

^?M£G

R7 "fl

—r/zu-r— V-^A
```

```
lOWEG 2 7MeG
R5

t-VjVw



00O03O



VI
6AU6



0047



C^. /Od



V3A

I2AU7




m]



5ET OP MWE CGMTACT3
"urJOEH T^'OiCAL T^LAYIPSG



'1,6 b-



KEY



PERCU55



AMPLIFIER



RIO

,j 1 1 MEG
- ui
```

```
;*-l7



.^C2B
047



rJ




zgo




R3Z
1 ^MEf^



■^ SOFT



OOQ2 5 .0OO2 2 ^^-l-



c^O |jOQQO^Q



ogog:?^ - ooaogo




r4o;



C^i



OJ



o



s-;g
```

BAQIO

PHO« O

l^

u

.^^-^

^^90

V 3B
2AU7 ^-24

305 V

-+250

fti^ort v4a;

^ ^^s

ul

.001
R4^A

.2' MEG

```
PEDAL SIGNAL


n3fl<5 .56 v^:.

CSI aND qj£ ARE OWlTTCD

VA TEflvllSiAL6(5 ABOUT 'OC vol I ^

i^lgA 15 47MELJ *ND <3 CONNECTED PE"wCErj V4-

IfciiMirJAufi AMD Ci-OUND ify CODE A£ fl ONlt,

R5^A i5 OMlTlt^ 1*4 C:^E.i: OMLV

'139f3?r^iJ CHMe.)j5 CONNECTED &ETa£?.^ V4TEP,WiNAl

3 iWC CC-JUNDj AiuD USED INMEADC" > 5v QlAS^ i« CODE

C Oncf.



N-l *■. U



3CSV



■=- 3




SPEA-^EA VOICE
COIL e Ohms



c27 used only \n

Amplifiers code
f and above.



^JOTE A^P'.LFiERS w;th no maraeo code

LETTE=J a:^E COCE A.



"T
```

```
Tt



PERCUSSION
. HAPMOMLC
PEPCU'SSION SELECTOR'

^OFF' Third-

I 1

"On' -SECC^JD^



T



W \-



^o5





■o

H



4hH
Rid



y 47000



20OVT6



RSe*!**

[^7000





• 205-^ '





C34
```

"f^.ODl

PERCUSS lON
5^■i^.AL.

I I

?oov5 "^

rfl

A"'

OP VJBRATQ

vg
J2AU7

SELECTED AT FACTORY TO
&AL*NCE CHANNELS

on

'per C 'J SSI ON

COT OFF"

ViSRATO LINE
SOJf TEt^tMIKALS

K'^ ®

Sr-1ALL

PERCUSSION

```
VOLLJMe-


r:53

— \wv-

4700



nee

-r-'VWv

^.7M£G

<JR5'*

1. 3 MEG



25 V


■'i'EPCUSSlON decay"



Q-O

^— 'AVv —

^^UOOO


-=- f^oaMAL



LZ


fy




VOLUME
```

SI

lJ

o

-VIBRATO PHA5E 5HIFT LINE ^

^

ENEHATQP OUTPUT
TERMINALS

PEDAL AMPLJ F^ER

vio

6BAfi

NO PED^L PRESSED OV
ANY PEDAL PRESSED JV

M

= EDAL CaSlE

J^ -z

```
C59^^o^



PEO*L

OF^Av^eAa



POWER SUPPLY



lEATER
PESiSTOfl



4SO0 (JQOOO FOR Z34VJ



1



POWE^
TRAP4SfORMEH
T7



;- Ji:



^ '^gc'



j-\



NO PEDAL ^HISSED 290V
ANY PEOAL PHE55EO lOOV



RUN
S W I TC H
—0



■3J0
```

```
R30

377

PEO-L
CUTOFF

' 5 TART ■
iWlTCK

250

STARTING

MOTOR

SYNCHRO-
NOUS
MOTOR

4700

IZMEG

r/>

PCOAL
ATTACft

R62

'WW—

S.9Me G

'ZZ
```

```
-o-



Z: waeov



S C6I
"J .00220^



CY



2 5 MEG



t ^



6 0V
HEATERS



^.



380 V



^m




zcoo



R96
6OOO



R97
150



C63 ^^%oo
```

```
RIGC
2200



V6 W6 X ti

NORMAL 'off



FA5r



T7





® ©



/^



. T5 ,r
I j.^^

EXPf^ESSJON .

CONTROL r-'



© © ©



T6





ALL DC VOLTAGES WEASLRED WITH ZO.CDO
OHMS-PER-VOLF VIETER^ ANO ALL CONTROL
TAGLETS TILTING TOWa^C ►^RONT OP C0N5OL



JUMPER

IN
SPEAKER
```

Plug

SPEAKER

Field
TiTTT-

*^^oo

f -tOOV 700 OMMS

RlDI

390OQ

Rioa

-60O

-19

PI 03

.V^AV-
lOOOO

PEOAL
DECAT

PEDAL SUSTAINING
CONTROL

TOP vjew of amplifier

.i^

```
CD D»£F F*GO*AA"a

PEDAL SIGNAL CONTACT OF LA^T
REOAL RRE5SED REMAINS OPEN

U^ED ONLY IN AMPLIF'.ER^ CODE & flS;D AB-T'VG



PEDAL rtEVfAlG
CONTACT CLOSES
AFTER ANY PEDAL
CONTACT 0PEV5



SEH



SCHEMA^C DIAGRAM

lAL NUM&ER J©aX3 AND AfeOVE



MODEL M-3



* « VALU6 IN CCLIE 4 AMPLlFi^K'



#■*«■ USEi ONLY IN C"L. h A Ahfl-^LlFlt Vti



SCHEMATIC DIAGRAM

MODEL M-3
FIGURE 44



22A



65



■on



/



id
```

o

ijpOfP MANUALS
DRAWBARS.

LOWER MANLfAL

IMATCHING

iTRANSrc'^MER

r— I I —y ^-•

GENETS A TCR5

49-91 USE
THIS CIRCUIT

OBfflS

"viBWaTO-D'
SOLO.

■ 2 MAMUAL

— 1 wATiHtMG "on

G£tJEPATQR5

A4,4B USE
THIS IlRCUiT ,^

■DjIC-^^

=0!

```
10OO3C' . -^ . .



ON

VtEPATO
LOWER

wanual"



P20"

i7MEG

RSI R2P.
JVSV„
lOMEG. .\3MEG

-^-w^-r 4*^%,^_-4— \w. —

470od iL_ J^^^l47MfG





iNTElRMEDiATE AMPLlFlE^R



CI3 J/ OODOH



CIO



NON VIBRATO
CHANNEL
INPUT



VlSR'^TC' rlHANJNEL
I^JPlJT





t
```

.27 MEG _[_

'^*230 -

5£:lECTED at
FACTORV TO

BALANCE
CHANNELS

,— ^^v^

.OG002C

2?MEG
AflA/^ — rVW*-

C3'/00l

"OMEG t^MEG
R5

0047

ffi

d>

KEEV CC^JTACT
RE5t5TANCE
WIRES ALL
I& 0KM5

GEt^ERATORS

ie-43 lse

THIS CiRCLIIT

VI

&Aue I J

V3A
i£AU7

SET or M^JE COT^TACTS
UNDER TYPICAL PLAYING KEY

R47
r^W^ —
4 7 MEG

T4 R^

P^RCUSSiON AMPLIFIER

C26

v7

T5

PERCUSSiOhi

PERCUSSION SELECTOR"

'OFF' 'THIRD"

! I

"ON" -SECOND"

```
EXPRESSION

CO^JTROL

/LOVO


OUTPUT AMPLIFIER

CZ3i;*'5ETAT fACTORV


^


25A


CgPnQOOCg Q


^-^


^t


'2Ai7


r4DV


CZI


CI5


CI6


I

r
```

```
O0022 ^002 E



R32



t+3?



■A/i^-' VvW



SMEG



I 6 MEG
O



"^^






♦



op

HADIO
PHON O






R4G
I MEG



0O0D24 - 00D090
V^5





^^ +290
```

u

o fr^2

. o

(tROM V4A)

305V

in

AMF^HFL^R CCDE G ANC ABOV £ - Ol/T^P JT
CODE H ANjD A feOVEl - C.3 ACE:'ED

,V6 ^

6V6 PJ

u

290

i>Ol

-—WA—

.27 MEG

T3

5tOV

```
3C5v


"O



SPEA
COIL



e OHMS



PtlDAL SjGKIAL



v9 '

2ftU7 ^00vT6



rt



^








o



200\H '




PEBCUS&ION
bl&NAL




H4




VOLUME
```

AMOUNT or VIBRATO

V9

I3AU7 J

SELECTED A"^ FACTCRV TO /
&ALANCE CHANNELS

ViG^aTO LIME
BOX TEfiroli^ALS

+

*32

4#

13

l*Ena;5SioN

VOLUME-

R55

— WVv-

4700

R60
-VAV

PERCUSS'
CUT 01

```
4.7WtG
R59
l.Sf^CG

■»-<^

^

JO

i\i

-f

25 V

R57 M /

62000

PERCUSSION DEC*Y
5LOW

EAST

nj

R5D

-=■ NORMAL

i32
```

E47

SMALL

LJ

L3 L3

.VA:-,-VVvVA-

RN^AL

^047

:^^1200C

^

-VIBRATO PHA5£ iHIFT i_lME

^

IERATOP OUTPUT

C56

TERMINALS

```
NO PE1>^L PREr^ED OV
ANY PEDAL PRESSED (V



PEDAL AMPL I nC-R

VIO

e9A6



PEOAL CABLE





01



c^EDAL
DRAW&AR



POWER SUPPLY



^'^^.>^. ('^^5E:j}



D91 RE5:6TOR




4500 fiSOOO FOR Z54V)



powe:^
_ transformed
1 T7



- NO PEDAL PRESSED 290V
ANV PEDAL PRESSED lOOV



R65

300OO
```

```
S ^"^7

■O — VAV
4700


PEDAL

Cutoff


Rei

-VV/v-




Tc57


^^^-^l


■^VvV


3gMEG


V6


^^MEG


'-2 2



Bl


'START'

5w;tch
```

R90

250
.000 FOR

STARTING
MOTOR

SYNCHRO

NOUS
MOTOR

% C&l -L
^^.0022

GV

t.OV
HE ATERS

c ^

380V

L

^v

R93

50

iJ+- 310

t20^

■^3Z

R95

-A'AV-
SOOO

A

C6

R56

— WA-

6OOO

Q+^90

^°/.

3 DO

C62

450

PEDAL
ATTACK""^'

y6

T7

T3

TS

T^:^H

I f

!T4

EXPRESSJON
CONTROL

r

!T6

© © O ©*--'

ALL DC VOLTAGES MEASURED WITH ?aOOO
OHh/S'PER-^OLT METEP AND ALL CONTROL
TABLETS TiLTfNG TOWARD FRONT OF COWSOlL

JUMPER''

W

i^PEAh^ER

P-UG

```
-lOOV


SPEAKER
FIELD

niTrm-


-0=


RiOO
"2200




700 OHMS


RiOl


i9OOO


'2 2


RiOE
'AVvt

leoo


-19


R105


^.


'400
```

■V:

25

PEDAL
DECAY

CCDD'EF F-GCAA'B

PEDAL SrGT^AL CONTACT OF LA^T
PEOAL PRESSED REMAINS OPtN

PCDAL I\EVIH& CONTACT
CLO&Eb 1/VMEN AWV PEDA.L
IE ri^L^^ED (AFT F.R.
PECAL SicUAL OCMTACT
OPEN^)AfcJO CPCN^ WHEN
PEDAL 15 RfcLeA^ED

PEDAL SUSTAI.-^ING
CONTROL

TCP VIEW OF AM^LJFiER

SCHEMATIC DIAGRAM MODEL M-3

SCHEMATIC DIAGRAM

MODEL M-3 - 904-85 Aid ABOVE

FIGURE 44A

66

"OFP;

r'

```
\

T\
IMATCHING

I TRANSFORMER

UPPea MANUAL5
DRAWBARS

LOWER MA>JLrAL
DRAWBARS

d

G£^CRAT0R5

THIS CIRCUIT

e

"VIBRATO TjKj
SOLO
>S MANUAL'

MATCHlWG "Of

RA^iS^GRMER

-^

iA

UPPER

MANUAL
```

BULBARS

Lrt

GENERATORS
44^46 U5E

TTHIS CIRCUIT ^

i^EY CO^JTACT
RESISTANCE
WIRES ALL
15 OHMS

C

s

s

GENERATORS

ie-43 USE
THIS CifVCuiT

LOWfR

MAMTJAL

BUSBARS

```
R20
^7MEG



3



^









o-'AW





ON

VIBRATO
LOWER
MAHVML '



AMPLiriER



intermediate: amplifier



Output amplifier



NQN VIBRATO
CHAt4NEL
INPUT





-V/vV^/A^v---
lOMEG VUviE':*

4TO'

<o



■OQl
```

```
P2B



CIO



47viFf^



,.0000 27



*l 5 _

(FROM VAj



SELECTED



R23
.27MEG



FACTORY Ti:
BALANCE

Channels



VI6RATO C*^ANNEL
iNPyT



i^



2 2V1E5 '

R7 Rfl

lOMEG 2 7 MEG

RS

I47G0'
```

```
c?o



VI

fiALie



C4
00-17



si*



SET OF NINE COh^TACTS
UNDER TYPICAL ^LAYI hiG KEY



(FROM



PERCUSSION AMPLIFIER



R47



47 MEG
R46



K



c2a



PERCUSSION
"OFF

t

'ON'



PERCUSSION
```

```
HARMONIC

SELECTOR"

"THJRD'

t

"SECONO"




*265




A^v^ —

,2 7 MEG



V4A

I2AX7^,

l-WV^J




fl)



c^5



EXPRESSION
CONTROL

/LOUO




C5




^^




lETAT FACTORY
```

```
C?0] /OOOOZO



V4&
J2A)«7



Cl6 A



0002? D0Q2Z



R32



ISMECX I I.BMEG



R33

-WW -



^'2-



Ti^



q:<



>fo



SOFT



oTgr

RAOIO
p f^Or4 o "



W3s^
```

```
CZ(



o\



R40
MEG






U>



ui



2<^



000024 -OOO



090



CZ7.






o

[ti?G*l J44^



"^ c:





f



□ 47
```

30SV

'255

1

V6 M
6V6 "

"0-19

^

T3

AMPLIFIER CODE <i AND ABOUE - OO'^^UT

T^P OMfTTED.

CDO^ M irJD A60''E - CI ADDED

CODE J AWD AiiOi-e - P4 SPf,/><ER.

*3zo

'ev6

3CSV

■J

```
krt



Of





SPEA^-Efl vOfCE
COIL S OHMS



O



15



2AU7



U



H



p^





c





Pl^DAL SlGWAL





O— ^



C34



,001
```

PEi^CUSSlON

I

M4

7 9

SCANNER

AMOUNT OJ^ VIBRATO

VOLUME

V

4

v9
lEAtn

SELfTCTED *T FACTORY TO
BALAf4CE CHANNELS

\

ViSP^ATO LINE
aOJf TERMINALS

t

```
PERCU5SIOM
VOLUME'



R33
4700




R60
■'VW^



25^



4 7MEG

R59
l_V/,

I5WCG



-31

-H

'pERCuSSiGnT
CUT OFF" j o

1^








P57

— w\^

32000



M '\
```

```
iSSlON OECAY



-^Wv


o


-=^ NOClMAL


>32



SMALL



l2 l3


8


8



"^n


Inorwil


R46


2 a MEG


.-^
```

```
lS

CN

L(0

LI* LI2

iriJ

L
LI4 jus

J ^ ^ Si* ^J
^ g_ g_ i ^_

8

u

s

^^12000

VIBRATO PH A5E IM\V~ LINE

^
```

```
C^



PEDAL AMPLI tier

eBA6



o





CS^.,01



P^DAL
DRA*VBAR



POWER SUPPLY



R91 RESISTOR f'*" '-^^E^) PQWEO

__»,V.'., -— ( TRANSFORMER

J50O CieOOQ FOR Zi4V) ] T7





*320



NiO ^ECAL ^^RESSEb 2qOv
ANY PEDAL PRESS-ID lOOV



■-235



S 77

■O — ^/vW-
4700



. I 9 MEG
```

```
RQ5 g^
30000?^ PEDAL

1 ^CUTOFF



0L



:D^-=^



-START'
SWITCH



350

1000 FOR
234V



STARTING
MOTOR



S^NCmRQ-

NCU5

MOTOR



J_L2MEG




— ^A^^V-

3.9MEG ^2MEG



^$?



V-r^^-2 2



GV
```

```
■ -J

C6iJ- ^'

-^.0022-

'^

v6

PEDAL
ATTACK^

NORMAL

I
I

FAS T

5 0V
HEATERS

R92

^U4 ff /"

320V

1
3201V.

'J}Q
```

— -^

*32

Ct2

C63

CbZA
'450

R96
60OO

Ft 97

ISO

=9^

00

X i

PEDAL
OECAY

"OfF

ON'

T3

```
,V5 (V6V (V5



EXPRESSION
CONTROL



^s;



ALL DC vClTACES MEASURED WITH 20.000
0HM5-PtR-yOL7 Mt'EP, ANO ALL CONTROL
TABLETS TJLTING TOAyiRD FRONT OF CONSOLl



eioi

IfiO



ntoo

2300



9-^*5



T:



'"Sioo



4go



10 OOO



-leo



Bi02
```

```
-wv.



stooo

C64



25



PEDAL Signal CONTACT OF LAST
PEOAL PRESSED REMAINS OPEN



PLOAL hEYlNi-- L'^'lTACT
LLCf.ci. ^mEN any pedal
IS Vr^..-^^. U 1 AT 1 tC
PF -■ _ S" -*JAl_ I.C^TACT

. (-,N'ij) ASjn OPEN'-t Wf^£N
PtOAL IS ftLLEASf O



PEDAL SUSTAIN I rJG

CONTROL



F-'-^ 'iPtA'' F



TO^ VIEW OF AMPLlFtER

SCHEMATIC DIAGRAM MODEL M-o

T

- 'yt'\'\^\. ri'i. OS -If I AN u A™ "'VI'-



SCHEMATIC DI
MODEL M-3 -
FIGURE 44B



AGRAM
1 09466



AND ABOVE
```

67

VIBRATO line: box

TO COWTflOL CAMEL TC SCA^m^R

DRAWBAR5

BgaBBBegg b

g^ggBB^

MATCHING TRAM5rORMER5

FREQUENCY
NUMBERS ~

t GN WIHE^ TO
COWTROL PA»Jt^

t:

^^ % 5^^ CC^JNECT SCAKMER
4 \ TERMl'MAL^ or

OTTOM

^ 3 w I p 1 5 TO
VIBRATO LJNE &CX

```
VlBRATOE SCANNER


GENEiRATOR


85


??


£6


rHEQUENCY


90i 7


t. I c c


o g c
45 €2| Be


ezi E
lL


67


91


73T 4e


TQ
```

```
O 54 <? 3^9

B«

ZL

6*^

""3l"0 X C37 C

o

16

6^^ c.^^t

83 ^,S9

1 1 i

^6 „52

8J ^57

c O
74 ^50

79 .55


fi* o^o ^
```

```
77 ^53

irl 26 4 2\ 9 26 2

24 121 2^ 5

SN_,

^ -3- V^

BL

^

\iRED

c o c

/^

1

~^^ IflN

B*^
```

WH

v..

^^

PERCJSSIC^J SWITCH

■_ _ _ _f^EAR -yjly^ WJTH COVER ?E_*^OVEp;

ri :■_■

-,-^-" "VT^

"^rr^^>V^'^>^^"^"^^V i:

. ^ ■ * ^-

--.-.vT.v-.:r^>j.-

^^-ite:

^^run" "start"
switch switch

BK

rp^

```
orF

1

TEL

0N

GY

Bk

N

&N

5PE*KPR PLUG riTS RECEPTACLE
OU AwPlIFiER

BN

BL

TEL

R90

BM
```

```
O

i_ _^ J

BK
fBL)

BK
(BL.)

LINE

PANEL

i I- r^

^^— !

GY Bl_ BN

PEDAL

Cljtoff

u

V

GN
W

(J
```

```
L


X |R



J



CO(_0« CODE


YElRgn"": >t'jTTL


BL^ef^


^^ -^ri ^1 1


R T

per:u5Sion'

CUTOrF '


B«

BN

«ED

OR

VEL

GN

BL

v^O

GY

WH


Black
```

```
RED

ORArjGE

YELLOW

GREEN

BL'JE
VIOLET

CEY

WMITE



GH



. r^iWJ r t_n * |_ J >



w

10:



AM_PL_lFiER

TQ .Su STAtN 5VVITQ1.
*^Dn EKPRE^^fCfJ COhTftOL



BN Jbl G^-JK |Bk_|sk_|BK_^!6K_^|BH_|Bk
rREO.rJOS i£ 11 10 9 fi 7 e



rJ3TES B




5 ^ ^ ^* ^ +

€ d' D C* C



PEDAL KEYBOAPD



STARTING
MOTOR
```

SYNC-

MOTOR

REFERENCE SYMBOL^ REFTR TQ SCHEMATIC
Diagram of o^^GAN mOD^L MO

WIRING DIAGRAM
MODEL M-3
FIGURE 45

WlRIMG DIAGRAM OF HAMMOND ORGAN CONSOLE MODEL M-3

68

VIBRATO LINE BOX

TO COMTPOL PAfJEL TO SCANNER

A. A.

^ r.

2 V 2 V r 3
C lO OJ n i> ro

fOCOl^TCO^, PAHtL-

IS _A__^ z

rn^0 , fiji a OiZo yf o jfijiFa fffl OS O' pi* 75

^'cT^

TO AMPU^PliR

0PAWBAR5

1 — r

S/ATCHING TRANSFORMERS

T2(lO*^EO manual.) Ti(solO liamuai.)

^1

Pi^^^

a o

7S 7^

5? SI

29 25

le

SOLO
VVAKiLiAL

•-V

```
WH



PECj-.L

DPAWBAP



BUSSARS



FPECuEMCY
NUMBERS "




6 O & i O 6 6

T5 74



6oo O^OiOCooobooooOoCHi^ O'liicio oCicioOoiibOo



52 Si



1 0666 60600006001
29 ^S (B



LOWER
M^frjLTAL




;^




VI O GV



VfH
```

```
; -o

th:l gh

RED


rEL

GN

f^^.


Cy BK




^IQ


/

y

:--"^'^v^'-^-'^-'-^.v='=---?--V-'---:^'^v^::^-^

■M

r-^T^v'^ ' ^'n^g^:
```

COWTRCL PAMEiJ

7 .

iV

.^^-^ JUMPER Wines

"^ ^0 % 5^X C:;^JNECTSCAMN£0

? 4\ T^RMINAL^ OF
V H 5■^ME NUMSERS

VIBRATO LINE 30X

P'e.^ a>^

VIBRATO^ SCANNER

GflA*' "= 0>jT<?0\^ PANEL-

*za

678

65<v 5ai

71 ^ Al'^

659 67t

```
jM'

051 6e»

A90

dST 674

CbBO

679

6S6

c

^

aio 7z

66-1

61& 06 0^ ^11 oaa o* oif o^ ozfc oi o<9 o^

OfeO 077

6C6

fitB4
```

```
'890



osi oaz



^3^



700 4fi



-^^^6 375



^3'^



6st OBO



5TC





&I_ACK TO CO'yTPCU
FftNEU



6&^



■?co:j<-:^5'



r « Bn WIRES TO

'SCAMWfR Vitt'^TO LINE

IMBEH5 g Qf^ WIRF3

TO SCAr^vjcB,





'f
```

```
er n 6'

sf 4? i?--'

/

>.v.v7j^:?.

TO SCnEOATOVV

.14

^

^-^EL 9K

'>'"VIC» f 9 .fl -'7" V*.

VlGRflT^ LJKJE BO*
3 Qn WlOES TO
VIBPATO LIME

i;x>'^

L

L
```

```
TD V16RATO
Ll^JE" I



CONTROL PAMCL

CflEAP Vl^w '/(ITH COVER removed)




GN



Clio




^



TO AMPLIFIER



Bft



fbSfe ^73



» Oil 029 Q5 <^2i Qio Qi7 03 02n 96



* * »



n K^



cL



-t rk



BN
```

```
gr

OA^

i_

9

NjREL) \gN a

9 D

jWH .YEl. ;gn ^

GN

I_J

BK

VUH rEL ^

I prRCU55^0N SWITCH
' ^ ^ _ ^EAP VIEW vvjTH COVER ^^Q-i^Ep)

GEMECATOR

^

"-■--^■^rsv.
```

```
.y-^\ y.-.^:-^-.-. .■^^-.-■-■.x

v .-.-.-^-it:" ^':^--^

.1^, .

i^d,1~

'TT^' ^"'^^:' ^' -■-'--'J -'TX'^x-^".:

■:\: ^x^ j:gj.v^--:-'.'.T-L-:^:z:s-z; :s:^.skki3^k^v

"rum' 'start"
5WfTCH Switch



TEL

5N



GT

BK

F190

&K iSL iBN
```

```
BL



YEL



BN




LINE
PAhiEL




M



3N




SPEAKER PLlG riTS RECEPTACLE
QN AMPLIFIER



V^



GV 6L BfJ

JJJ



5^^ GN

:^ O 6 p 1^



Gf



BJ



Tl T
```

```
E2r

H^:

COLOR COD£

^^

/

X

^

n / a7 \a L N ' kI mi j

Df o V b^

H
o d il

4

"T

PERCUSSION

CUTOFF
```

iSK

bki

fBL)

1

(a-j'

L

AMFUFIELR

^TO S USTAIN 5WfTClH_
^CN L,

;*PRESSI0N CONTQOe

B

. JBUG^B. Ib. l8rjKlJ«^9.^_^BK

```
FREQ.N0S.I2


■lO


a


4 3 2 I 4-


rHOTE5 B a" A G G f" F


P£DAL t<EY&OARD


STARTING

MOTCR


SVNC,
MOTOR


REFtRENCE ^XM50l5 RELEEn ^D ^HEMATIC

Diagram of organ model M'3


WIRING DIAGkAM of HAMMOND ORGAN COnSOlE MODEL M'3



WIRING DIAGRAM

MODEL M-3 - 90485 AND ABOVE

FIGURE 45A


69
```

>.

FIGURE 46

70

FIGURE *^&
SCHEMATIC DIAGRA.
M-lOO SERIES WITH AO-35
AMPLIFIERS: AO-29
POWER SUPPLY

r

■ (A^ ! I

fliO

fliU I

i?2i^ MANUAL

^9-9t USE
This C nCUH

12
MATC"INS

-C-^

```
|JP"CH

2

/-

IIIMIII

J ^

4+'-*ft USE I ^ J
t^iiS CJRCUiT 1 w ?

-AV^ ■ T

Awe-^*1

^U

-j"''Er.

L CLAHIXET

JEH
```

```
A ^ J




SEtTlOW5 C*N at OfPflfi^tD ATOM! TIME


1 -


MAlMUAt
JU5BAR3


ff>


2 -^ ^ V-ZyV-.^-^


14J


■ft- HJ USE


'^^^


o


■^ "'v^V^-


O ^



.LOW Eft ^
```

, r Flutes .

^StT Of NIN? :;C^J TACTS
U«£« TyI^iCa. Pi_AY-N& KEY

SFCTlONl CAN Bt DtP^EliETJ AT O^iE TlWE

Yt

no

CM-r4NEL

viapukTO

CAMCtL"!

MANUAL '

GAPl^=33ei30CP5
-■AW

rooo

AMPLlFjtLR

irjTERMEDlATE AMPLlFlElt

```
[-»^L*lNr7eff 30CP5-^
I C 13 if-OOOOi



OUTPUT AMPLIFIER



SAlN: 79«k30CP5'




50 V



"26






CiO



ooaiJ






BJS "■ -StLECrCD AT




.2^'rtEa.



fACTOJ^Y TQ
6Al,*NCt




EJlPHEiSlOM
CONTBQL

LOUC



C20rf .O000£0
```

■GAfN 'US i30 CS ■

-f

XvJj "^^yV-V^^

i£ a:^ 7 N-40 V

Cir

^r^^

.0000Z*-.O00D3O
IZA'J^ C CZ^* '.0*7

.1 ^t-

Ki&i »J3A.
.33 sc*fi‹ iWt(j;

90 ¥

^95

1*1

305 y

GAJN" 9S 'g i30 Crs

■XDOOiG

I _VWW* SVW— 1

— vww* — svvv-

I re M£6, i,7MEj.
R5

C3 l.QOl

€*

'000

V'B=*TC -D:mI6-

CMA^JNEL

-MA^JNEL /
iNP'JT /

1 7a jl ^ T

```
ViA

I — ^^/^-1


.00


r^RCUSSION AMPLIF^ER


6+^H5'


-00 1


,1 Hlfi-


^3«


a


.0C2Z


T3


303 ■^


PILOT


Jl
```

```
-— — ' PfDAI- SliJMAL

IL'

C.^

T«

^■4TME£
P4a

:o*7


EZ-OOO

XQ-^ AWPLjFlfft

a^sv

3'

^ ^i^

zcs

1*43
```

```
tJI




J9
liAU7




.030I



ris7




'>o



o^



cw



-lJOJ



rt)0L2 !jgMf6



.t;.



II



iAi^* 5 ^C- S ^00 CP&'



5E-U, t;ed *r i-^cTcftf



U &Air- = -*.i a '



CUT 0F»
```

```
1.5 wee.

6QH '-t'<^'t^ALS

SCA/-NEB

<-r*sT [:-:c*f" 3^i

rJ

-V

^9=.®,.

moc!:l^k R-U^iH

mi7

NE^E'fB 11

/I
```

\

J^EiFtER VOiCEl

T

AUOUMT OF VIMA'D

" VOLUME

iMALL

^t*

.T^^:^:^j

\ \ IP "4S

a

C26

,004:

.COS*. .005*r ..

'C056T -oos^r .ao5*r .ooiii -oossT ,cos*T .

0056 I .0056 .OOSfti OOSfi , .COi/

```
aooj


V


■;iBRATO °HA5E SHirT LIME


II


|*S"C1J5S"0M
1-'°^'


I


t


i-rAUMCMiC;


PEDAL


( POWER SUPPLY



J




4.




celeste: " celz^-'ezi''
```

```
5A\H= 3a « 30 C'S


KM3
.*'MES


r


^SOO ClflOOO f<l« i3-*v)


PEDAL AMPLIFIED

VIO


PEDAt tABLE



C55

.0001


NO PEHAI, '"tSSEO OV
ANY 'EOAL •*P<tSSEDlV



ii ±



CSi,..Oi


cea


"FfUM


,BL
```

```
IlOT LICHT

T7

ro ^NS •>^'^

R90

OFF

S7a 5

ft77
-AArVV-

^40 WBAI HIT«fB Mfl*.

177MI4'ET«^ f M 4 >liH^

'lAii WuTE'

u=

SV

SWITCH fiODO fQK

STAHTlhG

MoroB
```

SVNCMKO-
MOUS

I »AOTaB

- ™

■f3Z

C70

-11

i700

■ 61 ■'63 § 'flS

-W^A 'JW, w-r—VW-/. ■ ■ '. 3OMO

lAl I5«f&i iifhiCj

ED't SlG^'Ai. CONTACT OE UAST

-Pf^AL KEVIHG CONTACT CLGiES
AiHEr^ ANV PEDAL 'S =1CS5ED ; A-^ T^F^
PEOAL SiGnal CON'aCT OPEnSi and
OPC^.^ WHEN PHr^AL iS AELt ASEO.

w

5 'tCL

J>CIJTCIE'

```
'CDALSJ

T7

T3 I '^14)


F.fP"E53lON
r.O-'TDL


L,-

@®00@0®©©@0 ;•.

t^

j?av


5v

D '195

i-ZQS

fJT
```

```
n3« 197

j-,VAA — 1— -.^^A.



^.0 =^'^


O *2U


ALL ti.C. V0Lf"^<jE5 \^«A^U/TtD WITW ZO.OOa
QMM5-F'tH- VOlT VfTEP*rND ALLCOnTPOl
^*Bi.E'i TILT1N6 TOWARD rnONT OF ca^^ia*.t


Rior


'■•00


*io3


10000


-"VVVVV-T-


*oo


O


-f9 0-


'!T


"^
```

```
BAa&

TOP -Lirt liE AMPt flEll

t I

FIGURE 47

SCHEMATIC DLAGRAM

M-lOO SERIES WITH AO-44

AMPLIFIER & AO-29

POWER SUPPLY

71

r

■*fl-9i USE
T«ii CIRCUIT

■4* -*b USE
THIS ClBtU'T

tn

Z

■<

4

>-
-I "^
```

```
EC «

< >^

2 ^


6E:^[RAT0ftS

ifl - ^j USE


Tl


LfPPEP MANUALS


^ OWES MAVJUAL




BULBARS


2


£.


^:^







KDOaoaceoo )


-=:M-
```

DMUV DfJE Of TnESt SWITCH

iECT'GN5 CAhJ 6E DEPPf^^? D '' OfiE TiwE

LOWER
MANLTAL

^

^

(6flfc*-ooty

^

ij^

X

3=*:

'iTCH/'

```
U>^Eft TVPICAU Pi-AyiN6 KEY

DHL* DNf Of THESE FOUR SW:

SeCTiONS CAM fcE 0£P«tLS£D AT OhiE TIME

^TO B OUTPUT

pmcj^sioK

*

HARMONIC

1
I

RZC

AM^LinflEft

Cflif 001

►JON- VIbfiATO W^/ — ■W\*A
CHANNEL I I0ME6 3-3MEe

IMPUT |_,_| G*.IH>= 93e liDCPS -^

Xi I mg vz. 6Au6^

' SOv

intermediate: AMPL^FiE*

f-^-&A'Nr- 7ee I3C CP5— H
```

```
OUTPUT AMPLiriER

I

LL^

' VIBRATO

cancel"

UP^ER #
MANUAL '

7^'

:.5 6MES.

. ■' 2^

SELECTED AT
FiMlOHV TO

BALANCE.
CHA^JMELS

U-

GAiS- 7S»l30CPi

GAIN - lie 130 CPi

fits
```

```
_J7Mf6



(U)


■


>


.01


P3I
.33ME6


CONTl*OL

LOUD

4


V




C'6


r\


^000 LZ


son


.00021
```

```
C20r ..CfOOQiC


V*B

i2** 7 ' F-40 V


R32 I'i^

^WA — —■^-■^^-' — J


ft3* ^ P35
6B0Coi^ 6&000


Cf3

• .ooi:>6e



&AiN^ 35 e dO CPi


B7 Rfl

^AWS" V^W'—

I0wr6. i.7MCG&.


C3| j'OOi


/*7000


yiBBATO /,
CH^NNCL /
IHPIJT /


SiMt6^
```

,000

■tL5

T4.

M

-^

J

m

P£RCU5SI0N AMPHFIER

JH 7
— ^A^^'^ —
*7HE&

+

So

P50y

pii

```
.;7 WE.&'

.33

p4a

C£E

Si4 i i BiE

22COO^ 5 2.^000 ^

C (7

ClB

_0OI

c

H

.01

ME&

CZ3|j_f^5£T AT FA
.OOOOl^-.DOOOBO

'2'AI-/'^ e_ CL*J J.O*7

CTQFty

H
```

fl^e^ RasA? (7!-^ ssv

1

OOiE

j600

'^ RADIO ■' - *L5V t£^

fHONO (FROM V4a1

5-6 ^^L6

CZ5^
-047

30ev

■^ PEDAL £i6NAL

^-fe^ —

G-S V

W9

```
riiAU7 H50V Tfi

+

C30
25

^r^

R4fl
£ZO0

+ I»S

-J3

6AIN = 50C e 500 CPS

^

StLgCTIG >T FACTORY
T_P.BlA^*^NCE C"*NKELJ

^A I M = ^_S G

*^'Z-0 CPi

r£*<cuiSfaN 9

CUT Off i !

Ml

ry ^V*V-
```

```
""^ ft53

*'00



4;=


i'



1



R5&
Z£000-



'FAST DECAY' 5-:2



'33



1^



^^:^^J




.vi£5A_"_LiNt.

ECl TfHWli^*^_i





1466 .




l^




7*E RC_i;5lON I

i^°12' I
```

^..^©.

^

rrt

^

I J *

iCJ-^^'i AMPLIFIER

IHfUT

DU'PijT

K'OD£l*^'\ P-UN!1

AUOUKT OF VTEflATO

SMALL

A^

ftEvClE E

WEvtwB I'

```
1



SPEAKFTR VOiCEl
COl:_S 16


*' VD_LJWE
SOf T


3:


— ^n r^?:::;


i£OC



C36

-00^6


C37


^ocrfcT .OC56


C*0_J_ C4iJ_ C*y_ C43_L C4*__


®


FUE


1
```

```
CZ6


! ;?mE6


-00-*


!^


0OSt\ .005£


.0056


-oas6


.0056


.0056




.0056"


c-^a



.0C56


C49 I C£0_

.00561 -OOSt


T
```

```
1^

- — VIBfiATO PNA5E 5HirT LINE

^^^

"105

!r~Riio

\^

CELESTE I ' *■ CELESTE n

li^

r*

6ain= 30 S .30 CPi

.47 **»E6.

PEDAL AMPLIFIER
viO

CS9. .tDi

CS3

-OOOl

kO PEfiAT. PBES5ED OV
```

```
Arvv pe:ial PIESSEDIV



— .C5& S^^



^_g. PEDAL f^ESS^i C i£2 V




s

T





-.--<



C6S



"FDA-

[;KArt&Aii POWE^R SUPPLY

PILOT L^MT X

TRANSFORMER
T7



ftlsiST^R ('=^^£0)







-^C6*
',O0M7



'EAJS ^JTE'





RSi
```

```
^50C (IBODO rc« 234 V




ON



DV I *|.»^ rfSD' jfi- '-£!



«90



T

QPF



-o-



GV



5WITCH fkOOO '01\



iTAPTlNG
MOTOJl



5VNCHK0'

NOUS

MCTOt




<3^.



^™ .00 if



MOAL il&NAL CONTACT 0' LAST
```

```
/

^ — Pt&AL KEVINS CONTACT CLOSES

WHEN ANV PEDAL l£ PRESSEDtftf TER
PEDAL S^&^JAL COnTaCT OPEMSJ an3
OPENS WHEN PErjAL 'S ^ELEaSEIX

v6

w6

<o

Q

T3

T7

•"

rfn [Trio

C63

C65
CSG

Vft j (w^ (vl

EfPTl^iON
```

```
COhTROL

1

lI^_j

V4

il

vh) tV' fVS

r

L J

r"

>T6
I

L_ _

TO Piti5
:.£ *:- J]

e

335 V
```

-335*

5V

*3E

f::t

-+

:rc&£ ,"t:c&zfl "cfc2B

Bo/4^D l%:^'45o ^o/4■^o

jti_

^ce5
co/*oo

4aMao

:c0«

tO/400

ALL D-C. VOLTA&£S r^EA54jREfj WITH ^O.OOO
OrtMi'PEB- VOlT METEH *.ND ALLCC^TRCL

tablCtj tiltino Tow^n:j f^ONi d' Console

-o-z\

AO-25616

O-ifi

r;

25 /£5

BASS
'FAiT-

PEDAlS

PEDAL

T&P Wtt^ Of AwPtifJEfl

FIGURE 48

FIGURE '^S
SCHEMATIC DLAGR/-
M-lOO SERIES WITH A
& AO-67 AMPLIFIERS-

72

lit

5V

73

```
1


H

J


1

1





/


\


BlMPET ph*W ft«S




SK 4



&N


BL


On


" FIUN '

SWITCH
```

```
©1^


£*ITCH
OFF


^^"^


QR


"J


_J


~r


UTEi


UP^ tlUSTE


^"


1C MOLLIS I^WftLk


SOFT


TAST
OFOr


RfD ,
```

I 6 V \ -

iVftJj

fH

i

.'>-.

6N J .

BROKCN LlNLS INDICATE

U^'tf "*HUAL

PEDAL
DHAV'BAK

LOWEP MANUAL

A

/

V

```
/

V13RATC ^<5

SCANNER

S

\

b^

'0

V|(;ffATO'

SlA^Nf R

&

r

TT

Vifcn^A :- ^ N= -AS_^

; n () o o,o o o o q

VIBRATO l:NE 50X
```

6V

1\ »"

&y

31

T5 7^

A i

r 3 ^

si S

»

J ^^ I ff £

Z9 IE.

'Z Z T ?— -

■ J UPPCR T I
VAhJUAL ,

```
MflTCMlNfj TRflNSF:35p/ER :iBLt

FREOLrENCT

.9<

ri

Ll

1 iC ^ Ch c i
7S 74

4 i ^* Q L

[inrnrn

52 5j

>6ji m.t'iHintmiiU iiiiall ii MANUAL

f*NEk_

m.

-1

t^^
```

BK
HE

—

START
MOTOfl

MOTOR

LA MP I

ri

Vi

IB

TT?

^ £

LS

A fi3

f S ^

*•

I-- ■

■"-T"

61

lift ta

I

^S 6,

16 6 U 23ft II c?.66 * e£i s 036

ri

167

i

Ml

^ a

K £2 >! X)' »^ ^^ B7

Ai

37

—
£1

IT

GENERATOR

3 2f eo o2&

; £ ■& I JlJiirl rftSQjf lNCV

of 3 £5 C

```
^ NUMB f : R5

Vh^

10 VSl-JME £DF T Sw.-

^b^v"

AO-29 A.'-.'PLI'liK

B^ BK 6h 6" &r &K GY ! 6*; fiK riL 5N 1 ^L ^tL QL flFDaN<SN.
.'0^1 OOOCj)O0 O Oft^.] 0. O O D

mw---a^f

t

BL

W

G^^

h^

fx
```

```
./

iN^U'

AMPL1 = lE.R :AflLE.

-^

GV

???????

V(C

rrr


i


1


1 1 5r

1 1

i 'lo (
```

1

1 : (^^ !

rf^ '

1

1 1

i 1 yiL /

1

L .

1 1 . . 1 Of (

K ' ^^™

' : REC /

1

```
1 '

1


J 6N j


^.;\.:5


w [^ J O i-j G 3


st;^


6V


K A


t==p


&K




y


Tl


/lowcn^ matching
^manual; transformer


TirKn'ER_^
```

```
\".H


&L'


WH


\MANUALy
WH


6H2t2_DLDjWiRE


\


H^


1? BASS

SPEAKER


\


/


\


/


.^^


S"EAKE-,
16 DHMS
```

AO '^'^ AMPLIFJER

i

OUT*jT

Rf:^lH&EF\^TKN lMT
TYPE ^^

H o"Ti J t^o 'O ■J~ij J~T} o^ a~T:> cT ^ &X) cro &^ crx> o

A s" G

PEDAL KEY&OARD

S'KEVLRE SPEAKER
e OHMS

FIGURE 50

FIGURE SO

WIRING DIAGRAM
HAMMOND ORGAM
M-1 00 SERIES
WITH A044
AMPLIFIER '

U^ji~)dkvir 4£- dt

0^

w

<

Oh

o
o

in

u

(3

NOTES

THE HAMMOND ORGAN
SERVICE INFORMATION

M-IOOA

SERVICE MANUAL

SUPPLEMENT

HAMMOND ORGAN COMPANY

M-IQOA PRESET PERCUSSION UNIT

When added to the M-lOO series instrument, this unit adds five pre-voice percussion effects, including reiteration in three speeds. It also provides three percussion effects, '^Normal (Non-Vibrato)^', 'Vibrato", and "Delayed Vibrato". For the-rhythm accompaniment it also provides a "Cymbal -Brush" effect, the "Brush^' being on the lower manual, and available when played in a legato fashion each time a key is depressed. The "Cymbal"^ is available on the pedal and sounds each time a pedal is depressed. The ^'Cymbal-Brush" control turns these effects on and selects the "Cymbal-Brush" volume.

SELECTOR SWITCH

With the "Selector Switch" in the "Drawbar" position, the signals from the upper manual harmonic busbars are routed to their proper drawbar in the upper manual group. The following is a breakdown of the harmonic switching used in this kit;

HARMONIC BUSBAR SWITCHING AND REITERATION SPLIT

UPPER MANUAL

The Sub-Fundamental, sub-third and eighth harmonics are not switched. The sixth harmonic busbar is used for percussion keying. With the "Selector Switch" in the "Drawbar" position, all harmonic busbars are routed to their proper drawbar.

REITERATION SPLIT

ir A tr

Chime

A" CHANNEL

Znd

3rd

4th
(5th to Freq. Div.)
(1-1/4 From Freq, Div.)

un u

```
B" CHANNEL



DRAWBARS
Fundamental



Guitar



Fundamental
3rd
4th
5th



2nd



Marimba



Fundamental



2nd



3rd
4th
5 th



Xylophone



Fundamental



3rd



2nd
4th
5 th



Banjo
```

2nd
3rd
4th
5 th

Fundamental

78

MODE SWITCH

With the ^'Mode Switch" in any of the reiteration positions, the harmonics necessary to produce the "Chime'^ ^^Guitar", and ''Banjo" are all fed into the "A" reiteration channel only, while the "Marimba" and "Xylophone" effects feed harmonics into both the "A" and the "B" channels. This split into the "A" and "B" channels only occurs with the use of reiteration. Without reiteration, all effects are routed into the regular percussion system. The two reiteration channels are identical. You will note that across the secondary windings of the two input transfornners is located a fieldeffect transistor. The gates Q200 and Q207 are fed alternating pulses from a bistable multivibrator which supplies alternate pulses to each one of these gates. That is; one is on, while the other one is off. These gates shunt the signal to ground, thereby making the channel inoperative. These individual signals are further anriplified by a one stage transistor amplifier, Q201 for the "A" channel, and Q208 for the "B" channel. They are then mixed together and fed to a common amplifier which in turn feeds the percussion output terminal, terminal P on the AO-67 amplifier. The multivibrator which supplies the keying pulses for these two gates does not run continually, but rather is turned off and on each time a key is depressed on the upper manual. The multivibrator consists of Q205 and Q206. Q202^ Q203 and Q204 provide the necessary switch pulse to start the nnultivibrator.

NOTE: Whenever the reiteration is used, it connpletely bypasses the percussion

section of the AO-67 amplifier.

With the "Mode Switch^' in the "Normal", ^'Vibrato", or "Delayed Vibrato" position, the various pre-voiced percussions are routed into the regular Hannmond percussion system, in which case these percussion effects are now available at the percussion output terminal, terminal P on the AO-67 amplifier. With the "Mode Switch" in the nornnal position all percussion voices sound as nornnal, that is, they have no "Vibrato'^ With the "Mode Switch'' in the "Vibrato" position, a portion of the signal available at the P terminal is routed through an isolating resistor into the "Vibrato" input terminal, terminal '^B'' of the AO-67 annplifier, so that the percussion voices appear with the "Vibrato", In the "Delayed Vibrato" position, a portion of the signal available from the P terminal is routed to the base of Q214, It will be noted that the emitter of this stage is not bypassed and the output of this stage is relatively low. During keying, after a predetermined tinne lag, Q210 and Q2 11 turn off, and Q2 12 and Q2 1 3 go into conduction, thereby placing C211 across the emitter resistor of Q214, This materially increases the gain of the stage and as the percussion is dying away, feeds this amplified portion of the fading percussion signal into the "Vibrato" channel of the amplifier giving a "Vibrato" tail-off to all the percussion voices. Two positions of the "Mode Switch", "Vibrato" and "Delayed Vibrato" also effect the normal Hammond percussions when they are in use,

FREQUENCY DIVIDER

When using the "Chinne" effect, it is necessary to create a 1-1/4 harmonic for the proper reproduction of the "Chime" tone. This is accomplished by routing the 5th harmonic into an amplifier made up of Q227 and Q228. Q229 and Q230 rectify and further annplify this pulse which is then fed to a two-stage frequency divider, made up of Q231, Q232, Q233 and Q234. The output of this second frequency divider is then routed back to the "Selector Switch", and is used as one of the harn:ionics in the "Chime" effect.

NOTE: Because a frequency divider can only handle one frequency at a tinne, any

attempt to play two or more "Chinae" notes at a time will result in distortion.

CYMBAL AND BRUSH

The "Cymbal-Brush'' switch when in the "off position disables the keying functions necessary to produce the "Cymbal and Brush" effect. With the "Cynnbal-Brush" switch in any one of the "on" positions, the 8th harnnonic of the lower nnanual is disabled and this harnnonic busbar is used for keying the "Brush" effect. The pedal keying contact is likewise switched into its proper keying circuitry so that it will activate the "Cynnbal" effect each time a pedal is depressed,

BRUSH KEYING

With the "Cymbal-Brush" switch in any of the "on" positions, the base of Q217 is routed now to the 8th harmonic busbar in the lower manual. Anytime a key is depressed, the base'voltage of this transistor is routed to ground, and this stage stops conducting. The attendant rise in collector voltage is innpressed on one plate of C217 and on R262. The other plate of C217 responds by driving excess electrons off to ground through diode D204, the resultant positive voltage is then fed to the base of Q222, the "Brush" gate. To the base of this "Brush" gate is also fed the noise from the noise generator Q218, This noise is nov/ tuned in the collector circuit and fed through R279 into the "Cymbal and Brush" amplifier section.

CYMBAL KEYING

With the "Cymbal-Brush" switch in the "off" position, the pedal keying contact in the pedal switch is routed to the pedal control terminal, terminal "S" on the AO-67 am^plifier. With the "Cymbal-Brush" switch in any of the "on" positions this keying contact is transferred to the base of Q216. Q215 is connected between the pedal keying terminal, terminal "S" and ground. With no pedal pressed and Q216 conducting, reverse bias is supplied from the emitter of Q2 1 6 to the base of Q2 15. Each " time a pedal is depressed the base of Q216 is routed to ground. With Q216 not conducting the reverse bias on Q215 disappears and forward bias is supplied through R255, Q215 now conducts and routes the pedal keying terminal to ground. With Q216 in a state of non conduction its rising collector voltage is impressed on one plate of C219 and on R216. This rapidly rising pulse is fed to the base of Q219 and Q220. Here the pulses are sufficiently amplified and fed through the diode D203 and on to the base, of Q221, the "Cymbal" gate. To the base of this "Cymbal" gate is also fed the noise fronn the noise generator, Q218, The collector circuit of Q221 is tuned for the best "Cymbal" effect, and the output of this gate is coupled through R281 into the "Cymbal and Brush" amplifier "sec tion.

CYMBAL^BRUSH AMPLIFIER &£ NOISE GATE

The "Cymbal-Brush" annplifier section consists of Q224 and Q225. The output is taken from the emitter of Q225 and fed to the volume switch. The output of the volunne switch is then fed back to the noise gate. This noise gate, Q226, effectively shorts the signal line to ground when neither of the "Brush" or "Cymbal" effects are in use. R261 and 262 feed a positive voltage to the base of Q223 anytime that a lower manual key or pedal is depressed when the "Cymbal-Brush" switch is in any of the "on" positions. When this occurs, Q223 goes into conduction, thereby depleting the base voltage applied to Q226, With Q223 in a state of non conduction ("Cymbal-Brush" not keyed), sufficient base bias is supplied through R287 to the base of Q226, putting it into a state of conduction and thereby shorting the signal line to ground.

CHANGES A^m REVISIONS

Referring to Figure 56 of the M-IOOA Service Manual Supplement » the following components on the schematic have been deleted. These four components will be found in the middle and lower portions of the Brush and Cymbal keying circuitry. The following items have been deleted: C-218, R-265, R-275, D-204, and C-2A3- The following component values have been changed: R-283 was 47K is now lOK; R-285 was 470 ohms is now 100 ohms; R-296 was lOK is now 4-7K; resist or R-279 which was selected is now fixed at 4-7K.

Two Zener diodes, D-209 and D-211 in the power supply, have likewise been eliminated. D-209 is now replaced with a 68K half-watt resistor and should be designated R-325. These changes alter the voltages available from two of the taps on the power supply. The tap which was marked +91 volts should now be changed to read +80 volts. The supply previously marked -12 volts should now be changed to read -9 volts. On the schematic diagram, Figure 56, add a 220K resistor from the collector of Q-213 to ground. Designate this component R-330.

NOTES

o Dd y^ s:

■-< DJ '-' o

►«

A

>

^1

o

n

1

c

LJ

CO

»— '

en

N3

K-

O

O

O

1

3

```
1

o


?<




H-




ft



-13

ID h*-
CO

o









O



<

O

rt

rr



t

O




rt
```

n

m

3
o

<

a

o

(-*

o

m

CO

C

•O

i

M-IOOA PERCUSSION KIT WIRING DIAGRAM

FIGURE 52

82

I

^X)

^

*

1

```
Xi


o


U


<


<U




>




01


"





p^




i




a.

4-1

D
O





c




t-r

QJ
>





O
```

```
<;

o
o

I

<:

a:

u

P

a



<

CQ
U

X
in

a;



FIGURE 53



83




FIGURE 54



84



FE^iciiMiw siwal our

TO «-fc7, TERMINAL H
TO PRAuBAlt

FUhD.



TO D^auBAN

TO DDAUaAR -«
```

```
3HD Hnwfwir

TO DROWBM
4TH HflRWNi:

TD IJltlUftiR

ITU HMM04IIC

TO CrttAW^AN

?0 jL3-fe7. T£rWlMflL J



PEgg^a fM swira



SI

MOC£ SWITCH



^M ''f ,. ,.'* '-i^^it



TO Je-fc7. 7TIW1N4L J -*



TO »47,TD*.KPEPC. KETlWi} -*■




SI P05(TlCh5

1. DIIHFS

2. DtiWfllRS

3. UJITIhB

4. MMIMBA
5- XTLOP^WE
°- BAMJO



Hate 5 CHANGES IN L>iT£R PRODUCTION:

Pairs Eliminated: C3ia. C243, O304. 0211, R2e5, RZ75.
Parti Aaaea. R330. 2?0M. Tfom Q213 collector lo gfound.
Paris Ghangea: R325, SaK. irt olace of D2C9

R279 Fi"fld it 4?K

R2fi4 Naw 33K
```

```
R2BS Now lOK

R3B5 No^ lOD Ofims

R265 /io« 4,7K
All -91V ii-iei no^v -fiOV, All -12V Ujies now -9V.



'liv Fon s ^flres £)f ^EiTc^At^oN



l-l/j HAR^'ONIC fOfi i:hJ)'E



sih Haitf*onc



SI
flPUSH A CrMbOL SWI TCH



TO OfiE^k^d^^^



«rv ^HA^OM;c,L0U£iT HfiMLftC



1, „, CYMBAL [ I

■ ] tfl




uv



TD flO-fc7.TEfln.-^'',PED0L

(fr iHQ

^aafc^ ^EOW. «tT!HC £C*IT*CT



\'



-fOo.LJOf jm; '^riLfs. WjIO
```

101

5201

FROM ao-b7

Q

SI

-• *

iWiHtal

I ; OJI

FROM fiO't7

O

en I '

PO^EH iUPPL'

tCTES.

T, ALL THlNSiS^GflS, UHLES5 OTHEftuiSi SPECIMEO, fiHt 2r*35b5
2 fiLL StSISTOflS, U/^LESS OTHEBl-tSE SPELlFitC, ARE !/? WflTT
i Sk TCHES, 5H0Wi tf CIRCUIT SI i« -OF'" .POSITlOU;

%l IM '^ORHflL- POStTJONL

* SI ^N '■Dfrflt.bfli'S" posnion.

i. ALL DIODES, UNIE5S OTntRk^lSE SPE:ifrEQ, iPE I'-J^b.

-^ 1HF| t ,,

J 1311

\ \u%

&

NGISE
GATE

•^. CH*-<L l-T/a- HflPHONlC

E N £ fi 1 : a ft

B«USU K CT-3J1, KETtKO

_J »fi-

«l:*H i JTl-biL OUl

FIGURE 55

SCHEMATIC DIAGRAM
PERCUSSION

PRESET UNIT

r

I

> a

r

UPPER MANUALS

WING

LOWE?* MANUAL
OP AW BARS

—^\ — H '^*rci-iJr-*6

&CKJERAT0H5

-•g-gi USE

Trt|5 CI'^CUIT

ftENE'A"^aH5
THIS ClRClifT

-'

^,

4

```
^0 1 I



^ 1 1=

= ? -VA\V

^ -^ ^Vv^A^— -»



Vv_H_U_*_-__L



-I

<

z

o

U

J*

D

n

3



>

-I ^

< >

■J



^^E









, uR'JmFEt'







"^
```

IfFuLL i^iPGAh"

QNLT :iN£ Of 'HESE SW.TC^-
5ECT'0N5 CAN BE 0E^S£S5£D aTOME

iME

»»4r,UAL

^C "'AN

SflVERATO^tS

10- Hj use

THIS C.RCtjrT

u^

C^l-

<r>

```
:T0FMN6CflNTACrs
UNDEfl TYWC*lL PLAYING KEY

^. OI^Li ONE :>F 'l-lESf PSUfT i^'"HX

SiCTiON? CAN flE DEP'E!j5EQ A" ONE TIME

TES'^iNA^i

PEFICLJ55ICN

t?

MiftC

NJCU

+

HAS mGn iC

MON -VIBRATO

INPUT \~^
A*

KZZ
```

```
MANUAL
AMPLIFIER



Cfli' OO]



flra JC7
□0



lL.^-i-_-^



* VIBRATO
CANCEL'




fiSI

SAiN^93i3i30CPS

H>9 VE. 6Au6



tf.S




liOv



INTERMEDIATE AMPLITIER

I CI3 W-(10OO2

I



OUTPUT AMPLIFIER



W-



GAIN- 739130 CPJ
```

```
R?6



$-Ar-* ^


,-•


i>/E6


IJO



FACrOflY TO

1*IANCE

llHASfftJELS




EXPRESSION
COhJTROL

LOUQ



CZOi ^.OOQOZO



G*IN:i3®l3a CPS —

_C23Ur^5^T AT FACTQRV



H



CIS



r\
```

```
.30022

+-L5V "=5^ ^
1 I"

SOFT

.^V^

.oooea

o

sacoo:

VIBRATO
CANCEL
LOWEI
MAr^ijAL

1 35

SAJN= ^5 ^ '30 41*5

, i^^ife

H(^

OGO^D
```

```
R7 W3

VEIi- Z.7rM<E5.


C3|/-o6l


VIBRATO

CMAr^NEL
imPUT


PERCU5ilON AMPLIFIED


CI7
.0021


: -001



J40 V


,o:iooE*-.ocao90


^


JME3


^* RADIO " ~

PHGP^O

? H3S


fl3d<^ ff33A5 -i?-^ 35VI

o
```

```
*L5v -i-Z^o

(FROM V-*A)


=^^1 .33 --^iir.


5600



fv*l


■l


5.^'^ES





-^ PEOAl i.&NAL


r


PC
h3-


3 00 CPS

fEftCUSSiOM Y
CUTOFF 1_°


p
```

as7 "^
izooo:

T

+33

[in

111

^

/5CANnE«^.r T
5 1 J

1.

.

<;5a).,.®.,6.,6,_3

|T

AO-S£H AMPL^^iER

ENPJT

^JT^-J'

M001L4K R-UMT

1

AWOONT OF vl&R*TO

I

tL

flEvt^TB E

"REVEWr

5P- AKE*? VOiCE

COIL3 G
0-WS "ACr-J

" VOLUME "
5orT

t

r--

```
'66 ;

■aooo'


■-:>



I



^WCUSSiCN



^=^^J



iflOO





C37



3fl_






fiT -0OE6- .005




P-5
22^«E&



T



CZ6



.0D47-L
```

LiO L

■Tr-T-TT-

r^

Lr

.OOSST ^Of>5S

t!_ c^sL c**!_ c*7]_ "*aL

LI5

L»6

.0056

-00 56 I .O0S6

cjosfi I -cotr

{

VJe^i^TO PHA5E 5MIFT LINE

RfDAL

□ R^AJAH

POWER SUPPLY

"CELESTE I' -tLESTEH '

'SAJN^ eO ® 30 CPS

PEDAL AMPLF E^

PEDAL CABLE

X

C56

CS5
.OC0l

oa

I

NO PtOAL "VESSED OV

Ar*y PEDAL. P^CiSEO IV

"■ E F P* & r
PE3AL SIGNAL COKTACT OF LAST

T

■o

R7a

I MEG.

R77

-WiA"-

■u

.47N*E6.

5>s ::^c5a „^
^^li? Too?; "Jr

^^^^^

.0003

R3I

-VA--A-
4500

HEATED ,' - ,,--n\

[l^iJOO -OR i34 vj

I

```
,00047



TBANiFOPstES , f

■7 L



TO PIN.';

1^4 J'



'lUN
5WITCH



ON



^*'.-»> r.^<>'' ^i-f^^i



250







"5 TART
SV^lTCf-



^90









STAPTJ-^S
MOTOR



NO PEDAL "ES^EG Lz^V
ANY 'E:Al ""^S^e: C3^
```

fiV

(1000 rCH
^i3*vj

SYNCrrflO

NOUS

■>OTCl»

n

— m

r!6l

.00 E i ■

1

*■ HEAT

HEATEPi

335 V

K335V

i

```
Tt


-500

9

■





*3S




C6£A r:c6£s


-k




^:^'i50


33


*:^oo


u^4

^P^DAL 'KEYING CCN-MCT CLOSES

■ahEn arsiv o^DAl 'S Pf^E^3tDv^r^C=*
PFDAL Sl6NA'_ CONTAC^ OP^NS) ANQ
GP^'^S WHEN PEi^AL S ^E_EaSE!^.


_-AVA
```

```
3-3 Nf^


I

;aME6 >>cr,


CST-x

-^7 X


w

T'


i


85

30000

p?::iAL

CUTOFF


PtCAUS


"EDAL


T7


C6?| I TS



C&3

€65
Cfi6
```

```
= IIPBE55I0N

r.^NTRCL



^^_J


f'.



Vio) ■ vfi ; v5


y ^



®©@©®0®


r "

I

l_ J

r~

^Ta




SO/4W





it^*



■i-in
```

._4iD

EO/Aao

5V

ALL D.C. VOLTAGES v£A5uRED W|Tm LO,000
0'lM5-PEn-VOLT ME'E'< *ND AllCONT^CL
-ASLE-j tilTimg -C'^^ar:; c^o^t cf cohscle

<3-Z\

— to-ia

»u.u.:-*lH *Bt-Tia" ••■ILL D*»'*»«l a*I ■•'Ltl* Or-»l"iMH' a^ICI'lIff -

TOP VlE^ OF ^WFL.'JEl

CONSOLE SCHEMATIC DL\GRAM

y^ l£6ato

ATor

M-IOOA

+ t

FIGURE 56

-9-

87

BI^^ W]

^ jNEVEtA

SN

&N

6L

n

(

SWITCH SiMTC
IV O^^ OFF
1

LfiflK

fl.A«

```
ptM

auiSi

I

"■.una pA*

^laAATDT rVJBRAlO r^KRilTi;^ hUAATV
k:iaS^ ffLLSTr CHOfllfl Umall

I_L

TTT"

5

a

I

3N
```

```
EK

C?T

_B^ ^4^^^N

f. BK

BK


«AS3
MliT£

FWT
MCAT

,ttA:Oi CONTROL r*rHfL

UPFt» MAh,iJ^L

rtD*l

bltAW^AU

^

^ L
```

```
f V)6f2ATO ^<^ „ \

^3 WJRE^ Td\

VIBRATO

SCANNER

CABtE

lul

3


t D D

VIBRAtG Ll^E CABLE

QO CXOGOOq


t^

Crj 3 I d 6 5


VfSRATO LINE &0X


&v
```

```
SS££££5^ ? ??WS5

VIC

s.

#N

n^

htc

t*i

T

S

Xgv

;i^

sa?5.^ ^-

M
```

```
^'-^'''_ ^^■' lh t^^ap^^^^

^7

5Hinr>rD w^nf

r

T^/^LOWtfi^ MATCHING

T"



irn

u



ft

T"

1

i ODD

II


i2
```

nil 11

m

iS 2C

MI

MANUAL

T

MATCmN'j TRA^S^O^l^fcR ZtkBLE

WH

h-i

1 t ,

Tr

V MAN

R
UAL

```
-. WH

BL^kBL

*vf1

FffECUf.NCY

I) o

c c &

44^

I 'i- HI

ra

i!:

75 74

i> ^

5Z 51

ii^iiao
```

```
'HMPfltt


rn



ZS 2fi





Jfi


MANUAL I


J


VIC



l:


YEL


rk



POWEl LINT

w*»eL


at


-ff^=-ir
```

```
s^ir^^i^

J^t

1

PILOT ,'
LAMP

ife *0Z< » 9J6» 2 PISO

78 ^ fl^ fa ^ 5^ Bi fV 74| io 7% £*//* «
&K aii ** O?^ Ii9i6 *0Z< » W6B Zjiso T/ofe^ilZ

L^ l!Li^^^ TO ^-OLUME son 5W. ^ Yj^f

T^

h ii

h 7e i' &

5=

^T

GETN^fiATOR

3MJELDEC y^\RT.
```

« 73 *5jrH fRfpu ENhCY

'4=

KU

6T*HT

MOTOR

3UPPL.T

TO ^-OLUME SOFT 5W.

7 <==^

"I

n

AO-67-1 AMPLIFIED «ni *t jsNt^^ov
£ VWlft CTTJp\ D A*'\i_mHMij H ,
01

o o c g p o p

```
TIL

1

7-sr\.

r2 5a^'

Ifo OHVL*

J

iL

aMPCf FjEt^ Ch^B.^'^

s

i^

22z

-^

z
```

```
.Xyi.

./u:

^^!^^Zr4_L_



■flSjl^a^H ^



-



o


c=

MC &LOC< ni^V 1

o"

A0'3i2OO'

'O


JhJf*U"


OuTP\;'
```

```
NOTE
PLUGS MARKED

"X" ARE MATED

ON lATZ MODEL
M-lOO WITHOUT
END BLOCK ASS'Y



r_



a^JlBLfGT: Ibn [bK r&K TBK fBK T&K JBk ^BK TTl



I 15 \^Cn JZ II iO 9 B

jj , C B A* A fi' G

16



Bk Bhv IB^ BM ifiK B^



r* »



_of- DAAfat,»r EJUL^ I



■* 3 2 I

0' D C* C



^£DAL KEYbOA^O



S"REV£R6 SPEAKER
6 OHMS





AO-31208



WIRING DIAGRAM M-IOOA
```

FIGURE 57

SPIRING DIAGRAM M-IOOA

88

HM^T]-'

^R-Z0 3 U

^R'ZO^V ^

\c-Zo

^^ih V

^

fl-Z89
— V~

W«irE'SHl£LOE£l

-0

B 'CH^^NEk. if^Pt/T

H^i^2H

HI1>

/ r^p

'*•"

Y

r-^oo

^r^ip

■ ^-zs-ei — >- fcTi?V -

^OS'

M53S2U

•-OI5-'

— [ff-ZTzT- «

MMSIT-»

1

^

fe

Mft-3i g I—

!

Mff-3o3 [-^

^^'3QaU

i

■- t^-306) -*

<^3/V "- fc^Tsh

^4.^3

m

oj?fl*i

.^

'-2 '7 3) »

BRUSH £_£t/£L-^

t-ZO(

T

•-{ P.-30I Y -

o

iz?7,.- H^^^i^h

'PCT^USS)OV To

P Bu)

v Y

```
^8

+

^

55)^7-oSkH/rcK

H^29S"H

R-292,

#

1,
o

HtSIh -^ ^^^^^^

ME^a—

rf^PuT
```

^^-^4(k

- (^^9% T

-{R^33>

WHFTf
SHfCLDtp

wttrre

= ®

Hff-^38 1 -* ^R'^37U

^

FIGURE 58

PERCUSSION UNITS PARTS DIAGRAM

IMPORTJNT-Wh^n the organ is set up for operation, the generator should be freely suspended. To do this remo\x four hexagun head screws under shelf, turn four sleeve and washer assemblies over so that washers are down, and replace screws, tightening them securely. Use shims under console, if necessary, to set level in order that generator is free to move in any direction. Failure to do this will cause noisy operation.

The console back should be at least 1 14" from the wall to allow proper ventilation. Be sure that the motion of the pedals is not restricted by rugs or unevenness ot the fioor. When playing the console, see that no piece ot electrical equipment having a strong magnetic field is close to it. For example, an electric clock standing on the console can in some cases produce a loud hum in the speaker. This may occur also if a clock or other piece of electrical equipment is in an adjoining room close to the wall opposite to the organ.

Before plugging in the organ, be sure your electric supply is alternating current of the proper voltage and frequency as specified on the name place. It it is not, or if the frequency is not regulated, consult your dealer*

DATE Of LED

PEDAL CUTOFF ADJUSTMENT

If you find that a faint pedal note is heard continuously as long as the organ is turned on, this control probably needs adjusting. It is a slotted shaft located on the face of the amplifier and is set at the factory. To adjust it, set the expression pedal wide open, pull the pedal drawbar to its loudest position, leave all control tablets up, and play, then release, the liighest pedal key. Allow the pedal note to decay for at least 15

■

seconds, and then slowly turn the pedal cutoff control clockwise until the faint pedal note just disappears. Do not turn it any farther. This procedure will probably be necessary in case the 6BA6 tube is replaced.

PERCUSSION CUTOFF ADJUSTMENT

If the percussion tones do not fade away or their decay is unusually fast or stow, this control probably needs adjusting. It is a slotted shaft located on the face of the amplifier and is set at the factory. To adjust it, push in all drawbars, and push down only the tablets marked 'Tercussion Second Harmonic/' ^'Percussion Fast Decay," and 'T'pper Presets-Drawbars," Use a weight to hold down several keys on upper manual, and set expression pedal to loudest position. After about 5 seconds turn percussion cutoff control until the tones are just barely audible. Do not turn control any farther since this setting will provide the smoothest decay. This procedure should be followed in case the 12AU7 tube (nearest to end of chassis) is replaced.

MOVING OR SHIPMENT

If the organ is moved at all, always be sure that its weight is supported by the case and not by the pedals or pedal mechanism. Be careful also not to put undue strain on the legs. Aside from this, no special precautions are required if the organ is to be moved only from one room to another. If it is tn be moved some distance^ it is important that the generator be fastened duwn to the shelf. Remove and reassemble the four sleeve and washer assemblies with sleeves down and tighten securely. This will prevent serious damage.

OILING AND MAINTENANCE

CALTIONiOil at end of first year and only once a year thereafter. NOTE; Before oiling refer to oiling instruction label located on generator cover or back paneh Use the chart at right as a reminder, IMPORT.ANT: Use only special oil supplied with organ. When your supply is exhausted, you may purchase additional oil from your dealer or direct from Hammond Organ Company.

With the exception of regular oiling^ the organ will require little attention. If any servicing is required, call your Hammond dealer or write to the factory. Always mention the model and serial number, shown on the name plate.

RAPHJCS

PRINTED IN U.S.A.

HOOO-006059 9/83 1 300

HAMMOND ORGAN COMPANY

OMK^UNtCATlONS

PARTS ORDERING UJFORMATION

Uhen ordering replacement parts from the Hammond Organ Company, the following guidelines should be observed:

1) Address all parts orders to:

2)

HAMMOND ORGAN COMPANY
PARTS DEPARTMENT
4200 W. DIVERSEY
CHICAGO, IL. 60639

All orders should specify the model and serial numbers of the instrument that is being serviced. (Note: On late model instruments the model and serial numbers are printed on the tag attached to the underside of the organ keyboard

}

3) All orders should specify the Hammond part numbers of the desired parts,

4) All orders should provide a specific description of the desired parts. (For example; Power transformer, 15 volt zener diode, F through B key module, etc.}

PARTS LIST EXPLANATION

This parts list begins by listing all the major assemblies (designated) by ^C^) on pages 6^3 thru 6^4- Major assembly breakdowns are then listed numerically (CD » (T) ,@, etc. , <) on the following pages. The format for which major assemblies are broken down is shown below.

(6) Maj or Assemb ly

```
1
2

3



Minor Assemb ly



tt



II



tt



ft



b

c



Component of Minor Assembly
ti If If II



tf



It



ft



M



1

11

111
```

```
Sub-Component
PI



* «



II



Example :



( 6 ) Lower Keyboard Assemb ly



119-000095



1

2
3



Preset Kev Module
Preset Key H^dule
Key Module



057-054157
057-054156
057-054077-005



37 Visual Memory Cance 1 Assemb ly
a Spring
b Grommet



060-053454-001
012-028799
04 3-053308



m



Screw
```

i Washer

999-054489
999-000810

NOTES :

1. Assemblies not shown are NO LONGER AVAILABLE - NLA

2. Items without part numbers are NLA-

3- Parts listing does not insure availability

TABLE OF CONTENTS
MODEL M,M2,M3,M100

MAJOR ASSEMBLY

PAGE

MAJOR ASSEMBLY FRONT VIEW (MODEL M3 & MlOO SHOWN) 6-4

MAJOR ASSEMBLY REAR VIEW (MODEL M3 & MlOO SHOWN) 6-5

(T) CONTROL PANEL ASSEMBLY 6-6

Cl) STOP SWITCH (TONEBAR) ASSEMBLY 6-7

STOP SWITCH BASE 6-7

CONTROL SWITCH ASSEMBLY 6-7

UPPER KEYBOARD ASSEMBLY 6-7

UPPER RIGHT HAND ENDBLOCK 6-8

FRONT STRIP 6-8
LOWER LEFT HAND ENDBLOCK 6-8
LOWER KEYBOARD ASSEMBLY 6-8

101 LOWER RIGHT HAND ENDBLOCK 6-8

lU EXPRESSION PEDAL ASSEMBLY 6-9
U) PEDAL SWITCH ASSEMBLY 6-9
13^ MATCHING TRANSFORMER 6-9

14) GENERATOR ASSEMBLY 6-9

15) AMPLIFIER ASSEMBLY 6-10
16) REVERB AMPLIFIER 6-11
in REVERB UNIT 6-11

(^

SPEAKER.

6-11

19) VIBRATO LINE BOX 6-11
2?1 PEDAL VOLUME CONTROL 6-11

©

MISCELLANEOUS PARTS 6-11

22^ VIBRATO SCANNER SERVICE INFORMATION.. 6-12

M-3

Note: Item (ij not used on M, M2^ M3

Note: Item (T) not used on M-lOO

M-3

Note: Item ®,® not used on M, M2, M3

M-lOO

PARTS LIST M. M-2, M-

-3. M-lOO

(T) COf

1.

JTROL PANEL ASSEMBLY (M-lOO ONLY)

CONTROL PANEL

2.

SWITCH ASSEMBLIES
BASS PEDALS
PERCUSSION
VIBRATO

,..008-024530

UPPER PRESETS

REVERB & VOLl'ME

3.

INDIVIDUAL SWITCH

...008-024602

REVERB I & II

FAST DECAY

SECOND & THIRD HARMONIC

008-024605

,..008-024606

FAST DECAY

VOLUME SOFT

BASS MUTE

VIBRATO CHORUS & PEDAL LEGATO

VIBRATO CELESTE I & II

DRAWBARS , FLUTES , D lAPASON , ENSEMBLE

..008-024613

VIBRATO CANCEL

008-024619

CLARINET & FULL ORGAN

008-024626

4.

CONTROL TABS

. .031-036656

FAST DECAY (2 USED)

• * ^^ ^1^ ^ ^-^ ^ \i/ V -^ vy

031-036488

BASS MUTE

031-036657

. .031-036486

THIRD HARMONIC

■ W \^ ^^ ^k \^ %^ \J T ^m^ \J

031-036487

PERCUSSION SOFT

031-036489

VIBRATO SMArt.

VIBRATO CHORUS

. .031-036558

VIBRATO CELESTE II

■ m \j m^ ^ \J -^ \r \J -^ \-ii

031-036659

DRAWBARS (2 USED)

031-036481

. .031-036661

DIAPASON

W W ^r m^ ^U \J ^J \–f \-J fi–f ^U

031-036660

ENSEMBLE

031-036482

```
..031-036662


TRUMPET

031-036483


CLARINET

031-036484

*


..031-036485


REVERB I

031-036493

T

REVERB II

031-036494



..031-036495

3.

START SWITCH
```

008-024537

6,

RUN SWITCH

008-024536

7.

. .016-022885

a. LENS

V V X^r ^^ ^^^ H^ ^BH ^BH 'i^r ^_# ^^r

016-031454

b. PUSH ON CLIP

013-031468

©

STOP SWITCH (TONE BAR) ASSEMBLY

.120-021620-001

MODEL M-lOO

1.

TONEBAR KNOBS BLACK

IVORY

025-035570

025-035571

.025-035572

WITH RED DOT

a. KNOB SCREWS

821-070514

```
2.

TONEBAR CONTACT WITH SLIDER

060-036603

3.

BUS BARS

4.

.043-020574

5.

BUS BAR PANELS

025-020373

6.

PEDAL TONEBAR SLIDER ASSEMBLY
```

a. COUPLING INSULATOR M,M2,M:

Ml00

M,M2,M3

Ml00

!

060-035984

.045-020727

045-024517

©

STOPSWITCH BASE

^ -^

MODEL M

MODEL M2,M3

MODEL MlOO

©

CONTROL SWITCH ASSEMBLY

^^-»*^

MODEL M

MODEL M2

MODEL M3

■

I.

ROCKER TABS VIBRATO ON/OFF (M ONLY)

.025-020655-002

PEDAL ATTACK

025-020655-003

PEDAL DECAY

025-020655-004

VIBRATO LOWER MANUAL

.025-020655-005

VIBRATO SOLO MANUAL

025-020655-006

VIBRATO NORMAL/VIBRATO CHORUS

025-020655-007

AMOUNT OF VIBRATO

2.

TOGGLE SPRING

©

UPPER KEYBOARD ASSEMBLY

^*^^^

MODEL M

MODEL M2,M3

MODEL MlOO

1.

BUS BAR CONTACTS M,M2,M3

MlOO

.030-033445

2.

KEY CONTACTS

```
012-033530



3.

KEY COMB ASSEMBLY M,M2,M3 (1

USED)

057-021239




M,M2,M3 (3

USED). . . .

.057-021238




MlOO (1

USED)

057-038083


H


MlOO (3

USED)
```

```
057-037989



4.

KEY CHANNEL ASSEMBLIES M,M2,M3 (SHARPS)

057-035832




M,M2,M3 (

; NATURALS)

.057-035831




MlOO (SHARPS &

NATURALS )

060-033392



5.

KEY SCREWS (ALL)


850-000002
```

t

a. WASHERS

6.

nP'^TnP FFT T M M2 M3 . . . .

.042-022369

MlOO

■ 'a^ m^ ^mJ ^^ ^^ ^1^ ^^ w'

7.

DOWNSTOP FELT M,M2,M3

MlOO ,

042-001701
.042-031227

8. KEYS M,M2,M3

KEYS MlOO

©

SHARPS

C

D

E

F
G

A
B
CX

SHARPS

C

D

E

F

G

A

B

CX

```
UPPER RIGHT HAND ENDBLOCK
MODEL M»M2,M3
MODEL MlOO



(18 USED) 025-

(3 USED) 025-

(3 USED) 025-

(3 USED) 025-

(4 USED) 025-

(4 USED) 025-

(4 USED) 025-

(4 USED) 023-

(1 USED) 025-

(18 USED) 025-

(3 USED) 025-

(3 USED) 025'

(3 USED) 025-

(4 USED) 025'

(4 USED) - 025'

(4 USED) 025

(4 USED) 025

(1 USED) 025



■036295
■035666
■035667
■035668
-035669
-035670
■035671
■035672
■035673
■032672
-042279
-042280
-042281
-042282
-042283
-042284
-0422J5
```

-042286

025-024307

©

©

©

FRONT STRIP

MODEL M,M2,M3
MODEL MlOO

LOWER LEFT HAND ENDBLOCK
MODEL M,M2
MODEL M3
MODEL MlOO

1. PERCUSSION SWITCH ASSEMBLY (M3 ONLY)

a. ROCKER TABS PERC ON/OFF

PERC VOLUME

PERC DECAY

PERC HARMONIC SELECTOR

b. TOGGLE SPRING

c. SWITCH PANEL ASSEMBLY
LOWER KEYBOARD ASSEMBLY

MODEL M,M2,M3

MODEL MlOO

061-020371

051-024165

025'
125
025'
025
025

025

■024848
■000023
036083
■036084
■036082
■036081

119-000010

NOTE:

PARTS FOR LKB ASSEMBLY ARE
SIMILAR TO THOSfi^ USED ON THE
UKB ASSEMBLY (5

@ LOWER RIGHT HAND ENDBLOCK

MODEL M,M2,M3
MODEL MlOO

025-024847

8

@ EXPRESSION PEDAL ASSEMBLY

MODEL M,M2
MODEL M3
MODEL MlOO

1. PEDAL ASSEMBLY M,M2,M3

MlOO

2. RUBBER MAT M,M2,M3

MlOO

3. PEDAL SUSTAIN CONTROL M,M2,M3

4. LINK & BEARING STRAP ASSY M,M2,M3

5. PEDAL ARM M,M2,M3

MlOO

12

©

043-046347

028-020458
041-020456-003

PEDAL SWITCH ASSEMBLY

M,M2,M3
MlOO

1. PEDAL CABLE M,M2,M3

MlOO Oil

2 . ACTUATOR 045'

3. PEDAL KEYS BLACK (SHARPS) (5 USED) 025

BROWN (NATURALS) (7 OR 8 USED) 025'

4. GUIDE FELTS (2 PER PEDAL) 042'

5. UPSTOP FELT (26 USED) 042-

6. DOWNSTOP FELT (13 USED) 042'

7. ACTUATOR SPRING 012-

■024545

■020436
■031469
■031666
■021255

■020410
■031898
■020972

3 J MATCHING TRANSFORMER
MODEL M,M2,M3
MODEL MlOO

```
003-021752
003-024498



GENERATOR ASSEMBLY

MODEL M,M2,M3

MODEL M1OO
1* RUN MOTOR (ALL)

2. START MOTOR (ALL)

3. VIBRATO SCANNER M

M2
M3,M100

4. DRIVE COUPLING ASSEMBLY (RUN MOTOR TO

GENERATOR)

5. DRIVE GEARS COUPLING SPRING

6. MOTOR COUPLING SPRING (FLYWHEEL SPRING)

7. MAGNET AND COIL ASSEMBLIES

FREQ #1
M1OO FREQ
FREQ



021-035903
021-035137



n

?/2,4,6,9,1l



064-035769
012-031463
012-002345

065-036583
065-033268



FREQ #3,5,7,8,10,
```

```
12

FREQ #13 THRU 17

065-036582

MlOO FREQ #13

065-033271

FREQ #18

FRFQ #19 THRU 24

■

FREQ #25 THRU 30

065-033273

FREQ #31 THRU 36

065-033275
```

```
FREQ #37 THRU 43















9





©

+

*


AMP

I.

2.
3.

4.
5.
6.

7.

8.
9.

10.


M3 FREQ y/42

FREQ /M4 THRU 48

FREQ //49 THRU 54

FREQ #55 THRU 60

FREQ y/61 THRU 72
FREQ //73 THRU 91
```

```
LIFIER ASSEMBLY
MODEL M
MODEL M2
MODEL M3
MODEL Ml 00


065-033277

065-033176

065-033177

065-033160
065-033161

, . .003-028526


M3,M100
OUTPUT TRANSFORMER M,M2,M3


P W ■ ^_X 'm^ ^^ ^aJ ^^ ^^ ^v* ^^ \^

003-024157

003-024954

,. .003-024111


PERCUSSION MATCHING TRANSFORMER

MS.MIOD CT4)

PERCUSSION INPUT TRANSFORMER

M3,M100 (T5)

PERCUSSION OUTPUT TRANSFORMER

FILTER CAPACITORS

50MFD/450V

DUAL 50MFD/45DV

50/50/50MFD/450V

20/20/30MFD/400V,30V

40/20/20/30MFD/400V,25V. . ,

a. MOUNTING INSULATOR
SWELL CONTROL

a. TRIMMKR CAPACITOR


^B V ^^^ m^ ^^v ^r ^BH ^^m ^^r ^^^
```

```
003-036229
,..003-036498
,..003-024112

450-010070
450-040400

...450-040300
045-021032

499-021468
. . .060-020765


POTENTIOMETER (PERC & PEDAL CUT OFF)

VACUUM TUBES 5U4

fiVfi


676-000124

002-005201

. . .002-006703


6SC7

6J7
6J5


■ V V ^rf \^ ^^ ^-r' ^^ \^ ' ^^ ^^

002-006305
TOO0-000OO0-6J7

. . .002-006502


6BA6
6SN7


V ^B W ^» ^» ^^^P '^^ ^^ ^^ T^' ^^^ ^^^

002-006501

002-006306

. . .002-006500


6C4
12AU7


^B ^ V B—r ^_r ^hv ^r ^w^ ^v ^^F ^^^ ^-^F
```

002-006300

002-012300

. . .002-012301

LINE CORD (ALL)

■ ■ ■ tkJ *a^ k^ ^^ -^ ^^ 4#^ ^r ^B

011-053851

10 1

W

fe} REVERB AMPLIFIER (MlOO ONLY)

AO-35 (EARLY MODELS)
AO-44 OR AO-66 (LATER MODELS)

1. POWER TRANSFORMER AO-35

AO-44 (DOMESTIC) 003-024956
AO-44 (EXPORT) 003-036756

2. OUTPUT TRANSFORMER AO-35

AO-44, AO-66 003-036552

3. FILTER CAPACITOR AO-35 450-040200

AO-44

4. MINIATURE LAMP GE#12 6.3V/.15A 016-022885

5. LAMP HOLDER

6. POTENTIOMETER AO-44 R27 2K

AO-66 R6 IM 676-000101

7. TRANSISTOR AO-44, AO-66 001-021260

8. FUSE AO-44 ONLY DOMESTIC 3/4A 016-039512

EXPORT 3/8A

9. VACUUM TUBES 5U4/5Y3 002-005201

ECC83/12AX7 002-012301

6BQ5 002-006700

EZ81/6CA4 002-006200
ECL86/6GW8 002-006401

^7) REVERB UNIT MlOO ONLY 121-000046

s) SPEAKER M,M2,M3

MlOO (REVERB) 014-046896

(LOW FREQ) 014-030812

(HIGH FREQ) 014-024347

9 J VIBRATO LINE BOX 121-000053

1. COJL (LATER MODELS) 003-033303

(EARLY MODELS) 003-021842-003

OJ PEDAL VOLUME CONTROL

@ MISCELLANEOUS PARTS

1. GENERATOR SUSPENSION SPRING 012-033227

2. EYE SCREW
a. NUT

3. GENERATOR HOLD DOWN SCREW 824-000003
a. SLEEVE WASHER ASSY 060-021751

4. START SWITCH M,M2,M3 008-016944

5. RUN SWITCH M,M2,M3 008-024536

6. KNOB FOR START OR RUN SWITCH 025-002071
^ 7. MUSIC RACK BRACE M,M2,M3

' 8. MUSIC RACK THUMB SCREW M,M2,M3

9. MUSIC RACK HINGE MlOO ONLY 032-033414

10. REAR COVER MlOO ONLY

:m

HAMMOND ORGAN COMPANY
DIVISION OF HAMMOND CORPORATION
11700 Copenhagen Court / Franklin Park, Illinois 60131
(312) 766-6950

REPAIR

AND

DISASSEMBLY

O

r

VIBRATO

a

CAMMER

O

(A) Although this technical bulletin is based on scanner repair, it is not the single source of vibrato problems. Check existing switches, vibrato pre-amp. (tubes, etc), phase shift line box, and cables both to and from the scanner.

(B)

SYMPTOM

CAL'SE

^!iPa:r

(I) D<ad

(U) Vibrato Switch

(b) Vibrtto pre-amp, (Tubes, etc-)

(c) Open SlgnaL Wire to Une-box

{d) Open Froa Scanner ihlelded cable.

(la) Eeplace Svltch

(b) Replace tubea or other
defective cosponcnta.

(c Replace wires or repair
4 d) connections.

(2) Choppy Vltrato

m

(2a) Shorted capacltora on Ilae-box

(b) Open collfl on line box

(c) Oil saturated bakelitc Insularors vhlch
plclt up Icnpurlclea and short out the
staclonary plates to the D\alfi aaaeobly
chaaala of acanncr.

\A) Rotor plates rubbing agalnaC the stationary
plAtca Inelde scanner.

C2a) Replace defective com-
& b) ponents

(c) CXoan Stationary snd rotor
platen and replace insulat-
ors, icolacin^ thr ^taclon^iry
plates from the Tialn ^haasis.

(d) Check end play £.nd height of
rotor on gear and fhaft
assembly.

(3) Stow Vlhr*to

(3a) Seml-froxen bearing on gear aod shaft ^sseobly

(b) Poor tension on drive springs of the gear and shaft assembly.

(3a) Check oiling threads and for pvoper oiling.

(b) Replace g^ar and shaft CEsembly .

W Ko vibrato

(4) Frozen bearing on gear and shaft assembly

(A) Replai^e gear and shaft asseaibly.

(5) SqueAlLlog SouQd.

(3a) Tension springs of the carbon brushes elspositioned caualng the brushea to icake a aqucaklng sound against che rotor contact plna.

Cb) Dry bearlngi

(5a) Heat spring connection with soldering iron and spring will fall Into ic« proper position.

(b) Check for proper oiling.

12

PARTS LIST

```
Syn. Motor & Scanner

B Oil Cup Assembly

064-016844

Oil Felt

D Felt Retainer Spring

012-002996

Screws (3)
Screws (2)

Shielded lead and Cover Assembly

066-033247 and 066-033248

H Brush Lug & Insulator Assembly

End Brush Spring Assembly

066-016821

Brush Assembly

066-016958

K Screws (2)

846-040314
```

```
L Screw (1)

M Housing Cover Assembly
N Screw (4)

Cable Clip

Stationary Plate (16)

066-016829

Rotor Assembly

066-016828

R Screws (16)

816-080720

Insulators (16)

036-016747

Insulators (16)

045-021942

U Front Plate Assembly

V Bristol Set Screw (2)
```

999-002032

W Gear Housing Assembly

4

X Screws (4)

Gear & Shaft Assembly

018-033192 and 018-033193

-13

SCANNER REMOVAL. DISASSEMBLY MD REPAIR PfiOCEJXJRE

Q)

DETACH MOTOR AND SCANNER ASSEMBLY (A) FROM THE GENERATOR ASSEMBLY BY REMOVING FOUR NUTS FROM THE SYNCHRONOUS MOTOR WHICH ANCHORS THE MOTOR TO THE L BRACKETS OF THE GENERATOR ASSEMBLY.

iH)

(2)

(3)

(4)

(5)

REMOVE THE CABLE CONNECTIONS IN THE ORGAN SO MOTOR AND SCANNER ASSEMBLY IS FREE FROM ORGAN.

NOTE A. C, LINE BOX^ AND OUTPUT CONNECTIONS FOR REASSEMBLYi

LOCATE OIL CUP (B) AND OIL FELT (C) INSIDE CUP. THE OIL FELT MUST BE REMOVED AND THE

COTTON THREADS UNWRAPPED FROM THE FELT BEFORE SEPARATING THE SCANNER AND MOTOR. REMOVE

FELT RETAINER SPRING (D) AND LIFT UP ON THE FELT TO REMOVE THE THREADS. 'DO THIS VERY CAREFULLY TO AVOID BREAKING THE COTTON THREADS).

AFTER REMOVING THE THREADS FROM THE OIL FELT TAKE A PICK OR A PAPER CLIP AND REMOVE THE THREE THREADS FROM THE ONE SIDE OF THE OIL CUP BY PULLING THEM THROUGH THE HOLE IN THE CUP, THE THREAD FROM THE OTHER SIDE OF THE CUP NEED NOT BE REMOVED.

LOCATE SCREWS (E) WHICH HOLD THE MOTOR AND SCANNER^ASSEMBLY TOGETHER. REMOVE THE SCREWS

(6)

AND PULL THE MOTOR AND SCANNER ASSEMBLY APART. NOTE: THERE IS A GEAR ON THE END OF THE MOTOR SHAFT AND MUST BE GUIDED THROUGH THE HOLE OF THE SCANNER HOUSING TO SEPARATE THE MOTOR AND SCANNER.

REMOVE TWO SCREWS (F) FROM THE REAR COVER (6) Of- THE SCANNER. BEFORE REMOVING THE COVER NOTE THAT THERE IS A SHIELDED WIRE ATTACHED TO THE COVER. THIS WIRE IS CONNECTED INSIDE THE SCANNER AND THERE IS VERY LITTLE SLACK IN THE WIRE, REMOVE THE COVER AND TIP IT BACK CAREFULLY SO YOU CAN SEE INSIDE. LOCATE THE CARBON BRUSH AUDIO PICK-UP ASSEMBLY (J). THE CARBON BRUSHES MUST BE REMOVED BEFORE THE MAIN HOUSING ASSEMBLY COVER (f1) IS REMOVED^ IN ORDER TO PREVENT DAMAGE TO THE CARBON BRUSHES AND TENSION SPRINGS, LIFT END BRUSH (I) AND SLIP THE TWO CARBON BRUSHES (H) OFF THE ROTOR CONTACT PIN, (BE EXTREMELY CAREFUL OF THE ROTOR CONTACT PIN DURING DISASSEMBLY SO YOU DO NOT BEND OR BREAK THE PIN).

(7)

(8)

(9)
(10)

Cll)

(12)

(13)

SHOULD IT BE NECESSARY TO REMOVE THE CARBON BRUSH AUDIO PICK-UP ASSEMBLY (J). DESOLDER THE AUDIO WIRE FROM THE BRUSH ASSEMBLY AND RFMOVE THE TWO (2) SCREWS (K) . TO REMOVE THE END BRUSH (I) REMOVE SCREW (L) AND SEPARATE FROM THE BRUSH ASSEMBLY,

REMOVE THE FOUR C4) SCREWS (n) AND SLIP THE HOUSING COVER (M) OFF THE MAIN ASSEMBLY, NOTE: MARK THE HOUSING COVER (M) AND THE MAIN ASSEMBLY CHASSIS (U) TO INDICATE THE STARTING POINT OF THE SCANNER CABLE. ALSO MARK THE LOCATION OF THE CABLE CLIP (0),

STATIONARY PLATES (P) AND ROTOR (Q) ARE MOUNTED ON THE MAIN ASSEMBLY CHASSIS (U) . REMOVE TWO (2) OF THE STATIONARY PLATES (P), BY REMOVING SCREWS (R) , WHEN REMOVING THE STATIONARY PLATES FROM THE ASSEMBLY YOU WILL NOTICE THAT THERE ARE INSULATOR (S) AND (T) ON BOTH SIDES OF THE MAIN ASSEMBLY CHASSIS, INSULATING THE STATIONARY PLATES FROM THE ASSEMBLY (U) THEN REMOVE THE ROTOR ASSEMBLY (Q) BY LOOSENING THE TWO (2) BRISTOL TYPE SET SCREWS (V). TO AVOID DAMAGING THE ROTOR CONTACT PIN DURING DISASSEMBLY.

REMOVE THE REMAINING (14) STATIONARY PLATES AND INSULATORS.

CLEAN THE STATIONARY PLATES, ROTOR PLATES AND OTHER METAL PARTS USING A FREON SPRAY OR OTHER CLEANING SOLVENTS THAT DO NOT LEAVE ANY RESIDUE AFTER DRYING. AN ABSORBENT CLOTH OR SWAB CAN BE USED IN CONJUNCTION WITH THE CLEANER-
CAUTION; DO NOT ALLOW SPRAY

SPRAY METAL COATED PARTS WITH KRYLON CORONA DOPE (CLEAR),

TO GET ON OIL THREADS OR ROTOR PICK-UP PIN,

IN MOST SCANNER REPAIR YOU NEED NOT GO FURTHER IN DISASSEMBLY THAN STEP NUMBER ELEVEN (U) BUT SHOULD CONDITIONS WARRANT FURTHER DISASSEMBLY CONTINUE WITH NUMBER (13). OTHERWISE INSTALL NEW INSULATORS AND REASSEMBLE THE SCANNER.

IN REMOVING THE GEAR HOUSING ASSEMBLY (W) THERE ARE FOUR (4) SCREWS (X) HOLDING THE ASSEMBLY ON TO THE MAIN ASSEMBLY CHASSIS (U). UPON REMOVING THE GEAR HOUSING ASSEMBLY YOU WILL NOTICE THE BAKELITE GEAR AND SHAFT ASSEMBLY (Y) . THE SPRINGS ON EITHER SIDE OF THE BAKELITE GEAR ALSO INTERMESHES WITH THE METAL GEAR OF THE SYNCHRONOUS MOTOR TO DRIVE THE SCANNER.

(14) TO REASSEMBLE THF SCANNER REVERSE THIS PROCEDURE,

9/83

PRiNTED»NU.S.A.

HAMMOND ORGAN COMPANY

OMMUNIC*tlONS